

CDM



1073543 - R8 SDMS



Libby Asbestos Site

Libby, Montana

*Initial Soils Data Gap Sample
Collection Operable Unit 5 - Former
Stimson Lumber Mill Site*

September 10, 2007



Final Sampling
and Analysis Plan

**Final
Sampling and Analysis Plan
Initial Soils Data Gap Sample Collection
Operable Unit 5 - Former Stimson Lumber Mill Site
Libby Asbestos Site
Libby, Montana**

September 10, 2007

**Contract No. DTRT57-05-D-30109
Task Order No. 00006**

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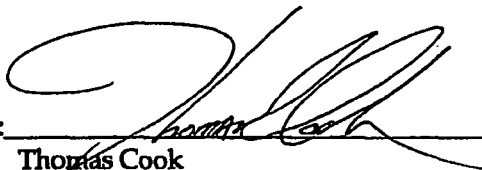
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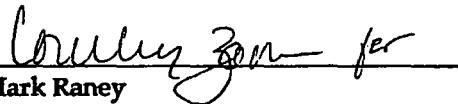
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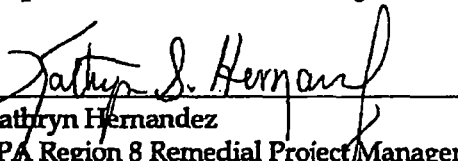
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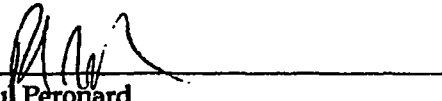
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Acronyms

BNSF	Burlington Northern Santa Fe
CAR	Corrective Action Request
CDM	CDM Federal Programs Corporation
COC	chain-of-custody
DSR	data summary report
DQOs	data quality objectives
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FSDS	field sample data sheet
FSP	field sampling plan
GPS	global positioning system
HASP	health and safety plan
IDW	investigation-derived waste
KDC	Kootenai Development Corporation
LA	Libby amphibole asbestos
LCPA	Lincoln County Port Authority
LTU	land treatment unit
NPL	National Priorities List
OU	operable unit
PM	project manager
PPE	personal protective equipment
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RI	remedial investigation
ROD	record of decision
RPM	remedial project manager
SAP	sampling and analysis plan
site	former Stimson Lumber Mill site
SOP	standard operating procedure
SWQAPP	site wide quality assurance project plan
USGS	United States Geological Survey
Volpe Center	John A. Volpe National Transportation Systems Center

Section 1

Introduction

This document serves as the sampling and analysis plan (SAP) to support sample collection required as determined by the initial soils data gap analysis performed for the former Stimson Lumber Mill site (site), operable unit (OU) 5, in Libby, Montana. The initial soil data gap analysis memorandum (CDM 2007a) is provided in Appendix A.

As additional evaluations of data specific to OU5 are completed, additional sampling efforts may be required. If additional sampling efforts are required, SAPs specific to the efforts will be generated prior to sample collection.

This SAP contains all the elements required for both a field sampling plan (FSP) and quality assurance project plan (QAPP). The RI SAP (CDM 2003) and this SAP were developed in accordance with the *Environmental Protection Agency (EPA) Requirements for Quality Assurance Project Plans, EPA QA/R-5 (EPA 2001)*, and the *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G4 (EPA 2006a)*. This SAP also incorporates all requirements as specified in the Site-Wide QAPP (SWQAPP) for the Libby Asbestos Project (CDM 2007b).

The purpose of this SAP is to describe the sampling objectives, locations, measurement methods, and data quality objectives (DQOs) for the initial soil data gap sampling program. The SAP is organized as follows:

- Section 1 - Introduction
- Section 2 - Site Background
- Section 3 - DQOs
- Section 4 - Sampling Program
- Section 5 - Laboratory Analysis and Requirements
- Section 6 - Assessment and Oversight
- Section 7 - Data Validation and Usability
- Section 8 - References

Appendices

- Appendix A OU5 Final Initial Soils Data Gap Analysis
- Appendix B Standard Operating Procedures (SOPs) and Site-Specific Guidance Documents
- Appendix C Health and Safety Plan (HASP)
- Appendix D Reflectance Spectroscopy Screening for Asbestos in Soil
- Appendix E Field Sample Data Sheets (FSDS)
- Appendix F Libby Asbestos Project Record of Modification Form

1.1 Objectives

This section defines the objectives of the initial soils data gap sampling program and the intended use of data.

As determined by previous investigations conducted at the Libby Superfund Site, Libby amphibole asbestos (LA) is present in multiple environmental media in Libby including: indoor air, outdoor ambient air, indoor dust, vermiculite insulation, and soils. As a result, residents of Libby may be exposed to LA, and these exposures may pose a risk of cancer and/or non-cancer effects.

The existing data set for OU5, presented in the OU5 Data Summary Report (DSR) (CDM 2007c), indicated data gaps related to soils at the site exist in the following locations:

- Libby Groundwater Superfund Site
- Former nursery waste bark piles and soil underneath
- Banks of Libby Creek
- Known areas of LA containing dust and/or soil
 - Former nursery shed
 - Former nursery activity-based sampling areas
 - Former guard station at Libby Creek
 - Diesel pump house
 - Soil sample location CS-09294

The objective of the sampling program described in this SAP is to collect data of sufficient representativeness and quality to evaluate LA asbestos content and presence/absence of surficial vermiculite specific to the areas listed above.

1.2 Project Schedule and Deliverables

Sampling is expected to be conducted between September and November 2007. Once the initial data set, collected as described in this SAP, is evaluated by the EPA risk assessment and management teams, additional data collection may be deemed necessary to support final decision-making specific to OU5.

Section 2 Site Background

This section describes site location, history, and information regarding the site.

2.1 Site Location

The Libby Superfund Site has been subdivided into seven OUs to facilitate a phased approach to cleanup (Figure 2-1):

- OU1. The former export plant is defined geographically by the property boundary of the parcel of land that included the former export plant.
- OU2. The exact geographic area of OU2 has not yet been defined, but includes areas impacted by contamination released from the former Screening Plant. These areas include the former Screening Plant, the Flyway property, the Highway 37 right-of-way adjacent to the former Screening Plant and/or Rainy Creek Road, the Wise property, and the Kootenai Development Corporation (KDC) Bluffs. The KDC Bluffs area is located directly across the Kootenai River from the former Screening Plant.
- OU3. The mine OU includes the former vermiculite mine and the geographic area (including ponds) surrounding the former vermiculite mine that has been impacted by releases from the mine, including Rainy Creek and the Kootenai River. Rainy Creek Road is also included in OU3. The exact geographic area of OU3 has not yet been defined but will be based primarily upon the extent of contamination associated with releases from the former vermiculite mine.
- OU4. OU4 is defined as residential, commercial, industrial (not associated with former W.R. Grace operations), and public properties, including schools and parks in and around the City of Libby, or those which have received material from the mine not associated with W.R. Grace operations. Highway transportation corridors such as Highway 37 (including the five miles of Highway 37 beginning at the intersection of Rainy Creek Road and extending into the town of Libby) are also included in OU4. Portions of Highway 37 associated with the Screening Plant are addressed in OU2 and are therefore excluded from OU4.
- OU5. The former Stimson Lumber Mill is defined geographically by the parcel of land that included the former Stimson Mill.
- OU6. The rail yard owned and operated by the Burlington Northern and Santa Fe Railroad (BNSF) is defined geographically by the BNSF property boundaries and extent of contamination associated with the rail yard. Railroad transportation corridors are also included in this OU.

- OU7. The Troy OU includes all residential, commercial, and public properties within the town of Troy.

OU 5 is situated in the eastern section of Libby, Montana on U.S. Highway 2 South (Figure 2-2). The boundary of OU5 is defined geographically by the parcel of land that included the former Stimson Lumber Company. The eastern boundary of OU 5 follows the western high bank of Libby Creek, and the creek is included in OU 4. The property is approximately 400 acres in size and is occupied by various buildings, processing plants, storage sheds including the central maintenance building, plywood plant, finger joint building, truck barn, office, and others.

Within the boundary of OU 5 exists the Libby Groundwater Superfund Site (Figure 2-3). The Libby Groundwater Superfund Site was placed on the National Priorities List (NPL) in September 1983 due to groundwater contamination resulting from wood preservative processing. Ownership of the remediation units related to the Libby Groundwater Superfund Site has been retained by International Paper. Two Records of Decision (RODs) direct three stages of work agreed to by Champion: an initial action and two long-term phases. The latter phases focus on cleanup of the groundwater, and cleanup of the soil, lower aquifer and source control. Groundwater and soil remediation efforts are currently ongoing.

2.2 Site History

The timber industry was a major foundation of Libby's economy for much of the city's history. The first sawmill was built in the winter of 1891-1892 near the present day downtown Libby. In 1906, the Dawson Lumber Company built a modern saw mill bringing workers and their families to the city in greater numbers. As early as 1914, parcels were bought and sold from private owners to companies such as the Dawson Lumber Company, Libby Lumber Company, and St. Regis Paper Company.

The facility was known as the J. Neils Lumber Company when wood treating began in approximately 1946. St. Regis Corporation purchased the company and facility in 1957 and continued to treat wood until 1969, when the wood treating plant was disassembled. In 1985 Champion International Corporation bought the facility; Champion later sold the mill to Stimson Lumber Company in 1993 and International Paper purchased Champion in 2000. Historical information regarding the Stimson property suggests that vermiculite products were used at, or transported to, the property at various times and at various locations. Additionally, vermiculite insulation was installed in buildings which were used during daily plant operations. It is believed that these products contain varying levels of LA.

In 1993, the Stimson Lumber Company purchased all of the parcels owned by the various private owners to form what is now recognized as the Site boundary. The Site is bounded to the north by the Kootenai River, to the west by Highway 2, to the east by the Kootenai National Forest and to the south by Gruber Road. The parcel of land containing Millwork West, a local lumber distributor, was sold by Stimson to private industries in 1998 and is considered part of OU4.

In 2003 the majority of lumber production activities at the Stimson Lumber Company ceased and the mill property was bought by the Lincoln County Port Authority (LCPA) and subsequently transferred ownership to the Kootenai Business Park Industrial District which is currently in the process of redeveloping the site. In 2005, LCPA sold the land to the Kootenai Business Park Industrial District. Details regarding the current use of the site can be found in the OU5 DSR (CDM 2007c).

Since 1999, EPA has conducted sampling and cleanup activities to address highly contaminated areas in the Libby Valley. The EPA investigation was initiated in response to published media articles that detailed extensive asbestos-related health problems in the Libby population. While at first the situation was thought to be limited to those with direct or indirect occupational exposures, it soon became clear that there were multiple exposure pathways and many persons with no link to mining-related activities were affected. The site was listed on the Superfund NPL in February 2002.

2.3 Summary of Previous Actions

Multiple investigation, pre-removal, and removal events have occurred at the site to date and are summarized in the following table:

Location	Date	Description
Characterization and Investigation Activities		
Former Nursery	2002, May	Microvacuum sampling in former nursery shed
Site-Wide	2002, September	Personal air, stationary air, dust
Bicycle motocross track	2004, May	Soil sampling
Central Maintenance Building	2004, May	Pre-Design Inspection (soil, dust, and bulk sampling)
Proposed Demolition Derby Area	2004, July	Soil Sampling
Former Nursery	2005, June	Activity-based sampling
Removal Actions		
Dry Kiln Tunnel	2002, December	Removal of pipe insulation
Truck Shop	2003, June	Removal of vermiculite insulation from walls
Plywood Dryers	2003, August	Removal of vermiculite insulation from walls, floors, and ceilings
Plywood Plant	2003, August	Removal of pipe insulation of northwest corner
Screening Building	2003, August	Removal of cement asbestos siding and roofing
Finger Jointer Lunch Room	2005, February	Removal of vermiculite insulation
Central Maintenance Building	2005	Removal of vermiculite insulation

The reader is referred to the OU5 DSR (CDM 2007c) for details regarding the actions listed above.

Section 3

Data Quality Objectives

The DQO process, based on scientific methods, is a series of planning steps that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. EPA has issued guidelines to help data users develop site-specific DQOs (EPA 2006a). These guidelines were followed for the development of the DQOs presented in this section.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The process also ensures that the resources required to generate the data are justified. The DQO process consists of seven steps; output from each step influences the choices that will be made later in the process. These steps include:

1. State the problem
2. Identify the decision
3. Identify the inputs to the decision
4. Define the study boundaries
5. Develop a decision rule
6. Specify tolerable limits on decision errors
7. Optimize the design

3.1 Step 1 – State the Problem

The purpose of this step is to describe the problem to be studied so that the focus of the investigation will be unambiguous.

As determined by previous investigations conducted at OU5, several locations within OU5 have not had soil samples collected to adequately delineate LA containing soils and also require estimation of the visual vermiculite content. These areas include:

- Libby Groundwater Superfund Site
- Former nursery waste bark piles and soil underneath
- Banks of Libby Creek
- Known areas of LA containing soil and/or dust

- Former nursery shed area
- Former nursery activity-based sampling areas
- Former guard station at Libby Creek
- Diesel pump house
- Soil sample location CS-09294

Soil samples and estimations regarding the amount of visual vermiculite present will be collected to determine the extent of LA contamination in these areas.

3.2 Step 2 – Identify the Decision

This step identifies what questions the investigation will attempt to resolve and what actions may result.

EPA seeks to determine: 1) the levels of LA and/or visual vermiculite in current site soils at specific locations within OU5, and 2) the levels of LA and/or visual vermiculite in the wood chip and waste bark piles within OU5.

3.3 Step 3 – Identify the Inputs to the Decision

The purpose of this step is to identify the environmental data that need to be obtained and the measurements that need to be taken to resolve the decision statements.

Because subsurface samples have been collected during previous investigations, soil sampling for this investigation will be limited to the collection of surface samples (0-6 inches). Previous sampling efforts and results are described in the Final Data Summary Report for OU5 (CDM 2007). In the absence of surface contamination, surface soil exposure pathways are considered incomplete. While isolated areas of subsurface contamination may exist, subsurface sampling has not proven to successfully identify localized areas of vermiculite and/or LA contamination and therefore will not be conducted at OU5 with one exception. Subsequent to completion of the treatment program associated with the Libby Groundwater Superfund Site, potentially contaminated subsurface soils will be exposed (approximately 18 inches below the current surface). Therefore subsurface sampling will be conducted in the land treatment cells and expanded landfarm areas that are part of the Libby Groundwater Superfund Site.

The wood chip and waste bark piles will be characterized to determine the nature and extent of visual vermiculite and/or levels of LA. Because the wood chip and waste bark piles are composed of different materials, one or more analytical techniques may be applied.

The information required to answer the study question are analytical results from soil samples and results of visual vermiculite estimations. Sampling methods used to collect information required to resolve the study questions will be collected in accordance with the procedures detailed in Section 4 of this SAP.

3.4 Step 4 – Define the Boundaries of the Study

This step specifies the spatial and temporal boundaries of this investigation.

3.4.1 Spatial Bounds

The information gathered to answer the objectives will be collected from within the boundary of OU5 as depicted in Figure 2-2. The vertical extent of the study area will be from the existing ground surface to the bottom of the deepest soil sample and visual inspection points.

3.4.2 Temporal Bounds

The temporal boundaries of this investigation include the time from when operations at the site resulted in vermiculite being introduced (early 1960s) to the time of this investigation (September/October 2007) and any additional sampling required in 2008.

3.5 Step 5 – Develop Decision Rules

The purpose of this step is to describe the method that EPA will use to determine the nature and extent of surface and subsurface contamination and estimate potential exposures to receptors in OU5. The data will also be used to determine if additional removal actions are warranted under the current removal criteria (EPA 2003).

For the wood chip and waste bark piles, a field screening tool will be used to determine presence or absence of LA at approximately 0.1 to 0.5% by weight. This approach will be used to gain a baseline understanding of the LA present in the piles. If LA is not found by the screening approach, additional sampling efforts may be required to determine if exposure to LA from the materials is above a level of concern.

The purpose of this step is to describe the method that EPA will use to make final risk management decisions from the data.

3.6 Step 6 – Specify Tolerable Limits on Decision Errors

The tolerable limits on decision errors, used to establish performance goals for the data collection design, are specified in this step.

Specific to the collection of soil samples for determining nature and extent, in making risk management decisions with PLM-VE results, two types of decision errors are possible:

- A Type I (false negative) decision error would occur if a risk manager decides that soil does not contain LA above a level of concern, when in fact it is of concern. The practical quantitation limit (PQL) for PLM-VE is 0.2% LA by weight. Preliminary inspection of Performance Evaluation (PE) Study data indicates a confidence interval about the PQL of approximately 95%. The PE study was conducted in accordance with the *QAPP for the PE Study for Analytical Methods for Asbestos In*

Soil, Part B, Revision 1 (EPA 2003b) and Part C, Round Robin-Analysis of PE Samples (EPA 2003c).

- A Type II (false positive) decision error would occur if a risk manager decides that levels of LA in soil are above a level of concern, when in fact it is not.

EPA is most concerned about guarding against the occurrence of Type I errors, since an error of this type may leave humans exposed to unacceptable levels of LA in exposure pathways at OU1. Our goal is to have 5% or fewer false negatives. Because our confidence interval about the PQL is approximately 95%, this goal should be achieved using PLM-VE.

EPA is also concerned with the probability of making Type II (false positive) decision errors. Although this type of decision error does not result in unacceptable human exposure, it may result in unnecessary expenditure of resources. Generally, EPA allows for a 20% false positive rate. Preliminary inspection of the PE Study data indicates little likelihood of not observing LA when it is present in soil. Thus, EPA expects to meet or exceed this tolerance rate using PLM-VE.

3.7 Step 7 – Optimize the Design for Obtaining Data

This step identifies a resource-effective data collection design for generating data that are expected to satisfy the DQOs. The data collection design is described in detail in the remaining sections of this SAP and other site documents referenced in Section 4.

Section 4

Sampling Program

This section summarizes field activities that will be performed during the initial soils data gap sampling efforts specific to OU5. This section also provides brief summaries of SOPs and additional site-specific detail that may not be discussed in the SOPs. For additional information, field personnel will refer to the SOPs included in Appendix B. The site-specific site health and safety plan (HASP) (Appendix C) and the comprehensive site health and safety program (CDM 2006) should be consulted to determine health and safety protocols for performing site work.

All activities will be performed in accordance with this SAP. Field personnel will also refer to the SWQAPP (CDM 2007b) sections listed below for details regarding requirements referenced in this SAP:

SWQAPP Section Number	Section Title
3.1	Sample Collection
3.2.1	Drafting and Approval of Governing Documents
3.2.2	Field Planning Meetings
3.2.3	Field Team Training Requirements
3.2.4	Field Logbooks
3.2.5	FSDSs
3.2.6	Investigation Specific Field Forms
3.2.7	Photographic Documentation
3.2.8	Global Positioning System (GPS) Point Collection
3.2.9	Field Equipment Maintenance
3.2.10	Handling Investigation Derived Waste (IDW)
3.2.11	Field Sample Custody and Documentation
3.2.12	Sample Packaging and Shipping
3.2.13	Modification Forms
3.2.14.1	Field Surveillances
3.2.14.2	Field Audits

The SOPs and site-specific procedures included in Appendix B are listed below:

- Sample Custody (Modified CDM SOP 1-2)
- Packaging and Shipping of Environmental Samples (Modified CDM SOP 2-1)

- Guide to Handling of IDW (Modified SOP 2-2)
- Field Logbook Content and Control (Modified CDM SOP 4-1)
- Photographic Documentation of Field Activities (Modified CDM SOP 4-2)
- Field Equipment Decontamination at Nonradioactive Sites (Modified CDM SOP 4-5)
- Control of Measurement and Test Equipment (CDM SOP 5-1)
- Site-Specific SOP for Soil Sample Collection (CDM-LIBBY-05, Revision 2)
- Site-Specific SOP for Semi-Quantitative Visual Estimation of Vermiculite in Soil (CDM-LIBBY-06, Revision 1)
- Site-Specific SOP for GPS Coordinate Collection and Handling (CDM-LIBBY-09, Revision 0)

The following sections are a summary of field activities that will be performed during the performance of the sampling investigation efforts described in this SAP.

4.1 Pre-Sampling Activities

Prior to beginning field activities, a field planning meeting will be conducted, any required trainings will be conducted, and an inventory of equipment and supplies will be performed to determine procurements needs. The following sections discuss these pre-sampling activities.

4.1.1 Field Planning Meeting

A field planning meeting will be conducted in accordance with the procedures detailed in Section 3.2.2 of the SWQAPP (CDM 2007b).

4.1.2 Training Requirements

Training requirements described in Section 3.2.3 of the SWQAPP (CDM 2007b) will apply to personnel conducting sample collection activities described in this SAP.

4.1.3 Inventory and Procurement of Equipment and Supplies

The following equipment will be required for sampling activities, and any required equipment not already contained in the field equipment supply inventory will be procured prior to initiation of sampling activities:

- Field logbooks
- Indelible ink pens
- Digital camera
- Sample paperwork and sample tags/labels

- Custody seals
- Zipper-top baggies
- Soil sampling equipment
- Personal protective equipment (PPE) as required by the HASP

4.2 Soil Sample Collection

This section describes the investigation efforts that will be conducted to meet the objectives of this SAP. A summary of all sampling activities is also shown in Table 4-1. All soil sampling efforts will be conducted in accordance with the current version of CDM-LIBBY-05 and evaluations for the presence of visible vermiculite using the current version of CDM-LIBBY-06, both SOPs are provided in Appendix B.

Prior to conducting the soil sampling activities described above, portions of the site may require bush-hogging and/or mowing to remove overgrown areas in order for the surface soils to be visible for the required inspections. During this activity, one personal air sample will be collected from the person performing the weed removal. This sample will be collected in accordance with the Response Action SAP (CDM 2003a). This sample will be sent for analysis by International Organization for Standardization (ISO) TEM method 10312.

4.2.1 Libby Groundwater Superfund Site

Investigations at the Libby Groundwater Superfund Site will include:

- Evaluation for the presence of visible vermiculite in surface soil throughout the area
- Surface soil sampling throughout the area
- Subsurface soil sampling and an evaluation for the presence of visible vermiculite in LTU cell 1, LTU cell 2, and the expanded landfarm area

Surface soil sampling will consist of one surface 30-point composite soil sample collected from each of the 100 feet by 100 feet grids shown in Figure 4-1. One visual estimation point inspection (PI) will be completed for each 100 feet by 100 feet grid.

In addition, subsurface sampling will be completed in LTU cell 1, LTU cell 2, and the expanded landfarm area to determine the status of LA concentrations and visual estimations from the interval of soil 18 to 24-inches below the current ground surface. One core will be taken from each grid as shown in Figure 4-1. This core will not be sent for analytical analysis. Visual estimation for the presence of vermiculite will be performed and the sample collected and archived. Sample analysis may be conducted in the future and will be determined by EPA.

4.2.2 Former Nursery Area

Past soil sampling efforts were restricted to exposed ground surfaces in this area due to the existence of three large waste bark debris piles, covering approximately 93,000

square feet (Figure 4-2). The piles contain material including bark, soil, logs, and rocks that were scraped from the surface of the log storage yard over a period of two years. The estimated dimensions for each of the piles are shown below:

- Pile #1 – 275 feet north to south, 300 feet east to west, and 20 feet high; containing approximately 61,000 cubic yards of material
- Pile #2 – 115 feet north to south, 75 feet east to west, and 15 feet high; containing approximately 4,800 cubic yards of material
- Pile #3 – 35 feet north to south, 45 feet east to west, and 20 feet high; containing approximately 1,200 cubic yards of material

To determine the removal options and potential future use of the waste bark debris piles, the material in the piles will be sampled and analyzed for a presence/absence of LA using a method to be determined by EPA in conjunction with USGS.

Using an excavator, test pits will be excavated from the surface to soil surface or a depth of 8 to 10 feet, whichever is encountered first, depending on the depth the excavator can safely reach. One test pit will be excavated from the center of piles #2 and #3. Test pits for pile #1 will be excavated on an approximate grid system with one pit excavated for every 10,000 square feet (100 feet x 100 feet grid system), resulting in approximately 8 test pits. Figure 4-2 indicates proposed locations for the waste bark test pits. Actual locations may be adjusted in the field.

For each test pit excavated, one reading will be taken from material at the top, middle, and bottom of the excavation – 3 readings per test pit. No sampling personnel will enter the excavation. Instead the excavator operator will place the bucket of the excavator at a location sampling personnel can access the bucket for the purpose of conducting the analysis. If the analysis method is not determined by the time of sample collection, the appropriate sample volume will be collected from each location and archived.

As part of this activity, personal air samples will be collected from the excavator operator and the sample collection personnel. This sample will be collected in accordance with the Response Action SAP (CDM 2003a). This sample will be sent for analysis by International Organization for Standardization (ISO) TEM method 10312. Each sample cassette will be visually monitored for the appearance of visual loading per the Outdoor ABS SAP modification, with the exception that sample collection will continue on a new cassette when loading is observed on the initial cassette. The new cassette will be given a separate index ID number and a notation made in the filed comments section of the field sample data sheet that the new cassette is a continuation of the sample collection period. The notation will also include the index ID number of the first cassette.

For outdoor personal air, the target analytical sensitivity for outdoor ABS samples is 0.001 s/cc. The target sensitivity is based on the calculations and rationale provided in the Outdoor ABS SAP (SRC and CDM 2007b). However, these samples are opportunistic in nature and are intended to provide an understanding of the range of

exposures associated with this activity. Because this activity is expected to produce a large amount of dust, prior to the start of vegetation control activities the area will be wetted to minimize generation of fugitive dust. In addition, the sample cassettes will be checked every 15 minutes for visual loading as described in the outdoor ABS modification. It is possible that cassette change out will have to occur, and as a result the target sensitivity may not be met. All sample cassettes collected will be sent for analysis. Separate samples will be collected from areas known to contain visual vermiculite at the current surface.

If the waste bark piles require removal, soil sampling and visual vermiculite evaluation will be conducted in the areas that are currently under the piles. One 30-point composite surface soil sample will be collected from each 100 feet by 100 feet grid covering the 93,000 square feet currently occupied by the waste bark debris piles.

4.2.3 Banks of Libby Creek

The portion of Libby Creek that flows along the eastern boundary of the site will be visually assessed for the presence of vermiculite and other mine related materials similar to the investigation conducted along Flower Creek in August of 2007 using the following techniques:

- A visual inspection will be conducted along all the exposed creek bed and adjacent bank areas to determine the extent of vermiculite and/or suspect LA-containing rocks. To the extent possible, visual inspections will be conducted in accordance with CDM-LIBBY-06, Revision 1. However, due to the nature of the material being inspected, a substantial portion of this document will not be applicable. The overall concepts of visual inspections and nomenclature outlined in Section 4.3 will be utilized.
- The following information will be collected/ documented at each location where vermiculite or suspect material is observed:
 - Location of any visible material via GPS measurements
 - A field sketch, which will include the lateral extent of contamination. A cross-section of the creek will also be completed at each of these locations and will include an estimate of the current water level.
 - A brief description of the extent of contamination will be provided in a field logbook, along with other required information.
 - Photographs will be collected to document existing site conditions.

In addition, one 30-point composite surface sample will be collected from each side of the bank for every 400 linear feet and a visual estimation inspection completed for each sample aliquot. The sample will be collected from the high bank on each side. Using this sampling approach will result in the collection of approximately 36 surface soil samples.

Sampling locations may be omitted by the field team if the surface material is not composed of soil (i.e., large pebble, cobbles, or boulders).

4.2.4 Storm Water Containment and Waste Water Lagoon Area

The previously unsampled area is bounded by rail lines on to the west and north, Libby Creek to the east and Fifth Street Extension to the South (Figure 4-3).

Investigations in this area will include soil sampling and an evaluation for the presence of visible vermiculite. One 30-point composite soil sample will be collected from each of the 100 feet by 100 feet or 500 feet by 500 feet grids shown in Figure 4-3. One visual estimation point inspection (PI) will be completed at the center of each grid. The larger grid size, 500 feet by 500 feet, will be used in wooded areas where the smaller grid size is not practical. The larger grid size in this area is deemed appropriate due the undisturbed nature of the area that includes large trees the pre-date any known disturbances in this area.

4.2.5 Wood Chip Piles

Several wood bark piles to the south and east of the former power house, Figure 4-4, are currently being distributed to local residents for use as landscaping material. To determine the removal options and potential future use of the waste bark debris piles, the material in the piles will be sampled and analyzed for a presence/absence of LA using a method to be determined by EPA in conjunction with USGS.

Similar to the sampling planned for the waste bark piles in the former nursery area, test pits will be excavated from the surface to a depth of 8 to 10 feet depending on the depth the excavator can safely reach. One test pit will be excavated on a grid system with one pit excavated for every 10,000 square feet (100 feet x 100 feet grid system) (Figure 4-4) Actual locations may be adjusted in the field as determined by the current location and volume of the piles.

For each test pit excavated, one reading will be taken from material at the top, middle, and bottom of the excavation – 3 readings per test pit. No sampling personnel will enter the excavation. Instead the excavator operator will place the bucket of the excavator at a location sampling personnel can access the bucket for the purpose of conducting the analysis. If the analysis method is not determined by the time of sample collection, the appropriate sample volume will be collected from each location and archived.

As part of this activity, personal air samples will be collected from the excavator operator and the sample collection personnel. This sample will be collected in accordance with the Response Action SAP (CDM 2003a). This sample will be sent for analysis by International Organization for Standardization (ISO) TEM method 10312. Each sample cassette will be visually monitored for the appearance of visual loading per the Outdoor ABS SAP modification, with the exception that sample collection will continue on a new cassette when loading is observed on the initial cassette. The new cassette will be given a separate index ID number and a notation made in the filed comments section of the field sample data sheet that the new cassette is a continuation of the sample collection period. The notation will also include the index ID number of the first cassette.

For outdoor personal air, the target analytical sensitivity for outdoor ABS samples is 0.001 s/cc. The target sensitivity is based on the calculations and rationale provided in the Outdoor ABS SAP (SRC and CDM 2007b). However, these samples are opportunistic in nature and are intended to provide an understanding of the range of exposures associated with this activity. Because this activity is expected to produce a large amount of dust, prior to the start of vegetation control activities the area will be wetted to minimize generation of fugitive dust. In addition, the sample cassettes will be checked every 15 minutes for visual loading as described in the outdoor ABS modification. It is possible that cassette change out will have to occur, and as a result the target sensitivity may not be met. All sample cassettes collected will be sent for analysis. Separate samples will be collected from areas known to contain visual vermiculite at the current surface.

4.2.6 Known Areas of LA Containing Soils and/or Dust

4.2.6.1 Former Nursery Area

Two locations in the former nursery area require additional characterization as a result of previous dust and/or soil sampling actions indicate LA is present in soils and or dust: the area surrounding the former shed and the area where previous activity-based sampling efforts were completed.

Former Nursery Shed Area

Soil and dust samples collected near the former nursery shed have shown high levels of detectable LA in previous sampling events. Therefore, additional soil sampling and a visual vermiculite evaluation will be conducted in this area. One 30-point composite surface soil sample will be collected from each 100 feet by 100 feet grid in this area (Figure 4-5) and a visual estimation inspection completed for each sample aliquot.

Past Activity-Based Sampling Area

Located near the center of the former nursery area and situated around the previous sampling locations (CS-09595, CS-09672, SQ-00067, and SQ-00066) is an area where LA has been found at trace concentrations (less than 0.2 percent). This area will be divided into a 100 foot by 100 foot grid system (Figure 4-6). One 30-point composite surface soil sample will be collected from each grid and a visual estimation inspection completed for each sample aliquot.

4.2.6.2 Former Guard Station Near Libby Creek Bridge

Past dust sampling at the former guard station near the Libby Creek Bridge at the former North Gate, indicated LA was present at concentrations of 44,116 structures per square centimeter. This sample result is based on a detection of one structure of LA; the elevated analytical result is due to a high analytical sensitivity for this sample, which is equal to the sample result. The guard station has been demolished since sample collection. To determine if LA is present in soils near the location of the former guard station, one 30-point composite surface soil sample will be collected from a 100 by 100 foot grid around the location of the former guard station. Visual estimation for the presence of vermiculite will also be conducted in this area for each sample aliquot. Figure 4-7 indicates the location of the former guard station.

4.2.6.3 Diesel Pump House

Dust samples previously collected in this building indicated LA was present at a concentration of 8,832 structures per square centimeter. To determine if LA is present in soils near the pump house, one 30-point composite surface soil sample will be collected from a 100 by 100 foot grid centered on the location of pump house. Visual estimation for the presence of vermiculite will also be conducted in this area for each sample aliquot. Figure 4-6 indicates the location of the diesel pump house.

4.2.6.4 Soil Sample Location CS-09294

The location of soil sample CS-09294 is in the vicinity of the area currently used by the Luck E G Post & Rail Company. Four 30-point composite surface soil samples will be collected from a 100 by 100 foot grid around the location of this former soil sample location to further evaluate and delineate LA presence in soils in this area. Visual estimation for the presence of vermiculite will also be collected for each sample aliquot in this area. Samplers may be required to adjust sample locations depending on the current locations of Luck E G inventory. Figure 4-8 indicates the location of CS-09294 and a proposed sampling grid for this area.

4.3 General Processes

This section describes the general field processes that will be used to support the sampling described in this SAP and includes references to the SWQAPP (CDM 2007b) and investigation-specific modifications to established project procedures when applicable.

4.3.1 Equipment Decontamination

Decontamination of soil sampling equipment will be conducted as described in Section 3.1.3.2 of the SWQAPP (CDM 2007b).

4.3.2 Sample Labeling and Identification

Samples will be labeled with index identification numbers supplied by field administrative staff, and will be signed out by the sampling teams (i.e., controlled). For air or dust samples one sample label will be placed on the sampling cassette. The sample identification number will also be written on the outside of the plastic bag used to hold the sampling cassette during transport. For soil samples the sample identification number will be written on the outside of both zip-top plastic bags.

Sample index identification numbers will identify the samples collected during the outdoor ambient air study by having the following format:

SL-7####

Where: SL = Stimson Lumber Mill Site
7#### = a sequential five digit number, beginning with 70000 to denote the sampling effort is being conducted in 2007

4.3.3 Field Logbooks

Field logbooks will be completed and managed as described in Section 3.2.4 of the SWQAPP (CDM 2007b). CDM SOP 4-1, Field Logbook Content and Control including project-specific modification is provided in Appendix B. Copies of all logbook entries will be provided to EPA and SRC within one week of collection. Electronic copies are suitable and will be placed in the project e-room within one week after the completion of each sampling event.

4.3.4 FSDSs

FSDSs will be completed and managed as described in Section 3.2.5 of the SWQAPP (CDM 2007b). Appendix E contains copies of the specific FSDSs that will be used to record information for samples collected during the activities described in this SAP. Copies of FSDSs will be provided to EPA and SRC within one week of collection. Electronic copies are suitable and will be placed in the project e-room within one week after the completion of each sampling event.

4.3.5 Photographic Documentation

Photographs will be collected, documented, and managed as described in Section 3.2.7 of the SWQAPP (CDM 2007b). CDM SOP 4-2, Photographic Documentation of Field Activities including project-specific modification is provided in Appendix B. Photographs will be used to document areas where outdoor activities are conducted. File names will be in the format:

OU5_date , where:

OU5 = Activity completed at OU5

Date = MM_DD_YY

4.3.6 GPS Point Collection

GPS location coordinates will be collected as described in Section 3.2.8 of the SWQAPP (CDM 2007b) and in accordance with CDM-LIBBY-09, provided in Appendix B.

4.3.7 Field Equipment Maintenance

Field equipment maintenance will be conducted and documented as described in Section 3.2.9 of the SWQAPP (CDM 2007). CDM SOP 5-1, Control of Measurement and Test Equipment, is provided in Appendix B.

4.3.8 Handling IDW

IDW will be managed as described in Section 3.2.10 of the SWQAPP (CDM 2007b). CDM SOP 2-2, Guide to Handling of IDW, including a project-specific modification is provided in Appendix B.

4.3.9 Field Sample Custody and Documentation

Field Sample Custody and documentation will follow the requirements described in Section 3.2.11 of the SWQAPP (CDM 2007b). CDM SOP 1-2, Sample Custody, including a project-specific modification is provided in Appendix B. Copies of all chain-of-custody (COCs) forms will be provided to EPA and SRC within one week of collection. Electronic copies are suitable and will be placed in the project e-room within one week after the completion of each sampling event.

4.3.10 Sample Packaging and Shipping

Sample packaging and shipping will follow the requirements described in Section 3.2.12 of the SWQAPP (CDM 2007b). CDM SOP 2-1, Packaging and Shipping of Environmental Samples, including a project-specific modification is provided in Appendix B.

4.3.11 Modification Documentation

All deviations will be documented and recording according the requirements described in Section 3.2.13 of the SWQAPP (CDM 2007b). A copy of the modification form is provided in Appendix F.

4.3.12 Field Surveillances and Audits

Field surveillances and audits will be conducted according to the requirements described in Section 3.2.14 of the SWQAPP (CDM 2007b).

4.4 Quality Assurance/Quality Control (QA/QC) Activities

The QA/ QC actions required for each process described in this SAP will follow the requirements described in the SWQAPP (CDM 2007b).

Table 4-2 summarizes the collection frequency for QA samples and indicates corrective actions that may be required based on their results.

Section 5

Laboratory Analysis and Requirements

The laboratories used for all sample analysis will have participated in, and acceptably analyzed, the required parameters in the last two proficiency examinations from the National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program. The laboratory must also analyze project specific performance evaluation samples or other reference materials when requested. These analyses must be performed before any samples are submitted to the laboratory to confirm the laboratory's capabilities and may be subsequently submitted at regular intervals. In addition, the laboratory must participate in the laboratory training program developed by the Libby laboratory team.

5.1 Analytical Methods

This section describes the analytical methods that will be used to analyze samples collected to support this SAP.

All soil samples collected as part of this effort will be analyzed for asbestos by PLM-VE in accord with SOPs SRC-LIBBY-01, Revision 2 and SRC-LIBBY-03, Revision 2.

All air samples collected as part of this effort will be submitted to a subcontracted laboratory for analysis using the International Organization for Standardization (ISO) TEM method 10312, also known as ISO 10312:1995(E) (CDM 2003), with all applicable project specific modifications, including LB-000016, LB-000019, LB-000028, LB-000029, LB-000029a, LB-000030, LB-000053, and LB-000066a (CDM 2003b). All asbestos structures (including not only LA but all other asbestos types as well) that have appropriate diffraction patterns and EDS spectra, and having length greater than or equal to 0.5 μm and an aspect ratio $\geq 3:1$, will be recorded on the Libby site-specific laboratory data sheets and electronic deliverables.

5.2 Analytical Sensitivity

The target analytical sensitivity for all air samples is 0.001 s/cc. All air field blanks collected as part of this program will be analyzed by counting a number of grid opens that is approximately equal to the number of grid openings that are analyzed for field samples. It is expected that this will be about 30 grid openings. Rational for this sensitivity is provided in Section 3 of the Outdoor ABS SAP (SRC and CDM 2007a).

5.3 Holding Times

No preservation requirements or holding times are established for soil samples collected for asbestos analysis.

5.4 Laboratory Custody Procedures and Documentation

Laboratory custody procedures and documentation will be completed as required by

the specifications detailed in Section 4.5 of the SWQAPP (CDM 2007b).

5.5 Documentation and Records

Laboratory documentation and records will be completed as required by the specifications detailed in Section 4.7 of the SWQAPP (CDM 2007b).

5.6 Data Management

Sample results data will be delivered to the Volpe Center and CDM's Cambridge office both in hard copy and as an electronic data deliverable (EDD) in the most recent project-specific format. Electronic copies of all project deliverables, including graphics, will be filed by project number. Electronic files will be routinely backed up and archived according to individual laboratory processes.

All results, field data sheet information, and survey forms will be maintained in the Libby project database managed by the Volpe Center under the oversight of the Volpe Center database management team.

Section 6

Assessment and Oversight

Assessments and oversight reports to management are necessary to ensure that procedures are followed as required and that deviations from procedures are documented. These reports also serve to keep management current on field activities. Assessment, oversight reports, and response actions are discussed below.

6.1 Assessments

Performance assessments are quantitative checks on the quality of a measurement system and are appropriate to analytical work. Performance assessments for the laboratories may be accomplished by submitting blind reference material (performance evaluation samples). These assessment samples are samples with known concentrations that are submitted to the laboratories without identifying them as such to the laboratories. Laboratory audits may be conducted upon request from the EPA remedial project manager (RPM) or Volpe Center project manager (PM).

Performance samples will be submitted to each laboratory analyzing samples associated with this investigation. The submission frequency is not defined, but may be once every three months.

System assessments are qualitative reviews of different aspects of project work to check on the use of appropriate QC measures and the functioning of the QA system. Project assessments will be performed under the direction of the QA managers, who report directly to the CDM president. Quality Procedure 6.2, as defined in the CDM QA Manual (CDM 2005), defines CDM's corporate assessments, procedures, and requirements. Due to the amount of sampling and the duration of the Libby project, both a field audit and an office audit are scheduled for the Site annually.

6.2 Response Actions

Response actions will be implemented on a case-by-case basis to correct quality problems. Minor response actions taken in the field to immediately correct a quality problem will be documented in the applicable field logbook and a verbal report will be provided to the CDM PM. For verbal reports, the CDM PM will complete a communication log to document the response actions were relayed to him/her. Major response actions taken in the field will be approved by the CDM PM, the EPA RPM, and Volpe PM prior to implementation of the change. Major response actions are those that may affect the quality or objective of the investigation. Quality problems that cannot be corrected quickly through routine procedures may require implementation of a corrective action request (CAR) form.

All formal response actions will be submitted to either CDM's QA manager and/or project QA coordinator for review and issuance. CDM's PM or local QA coordinator will notify the QA manager when quality problems arise that may require a formal

response action. CAR forms will be completed according to Quality Procedure 8.1 of the CDM QA Manual (CDM 2005d).

In addition, when modifications to this specific SAP are required, either for field or laboratory activities, a Libby Asbestos Project Record of Modification Form (Appendix F) must be completed.

6.3 Reports to Management

QA reports will be provided to management for routine audits and whenever quality problems are encountered. Field staff will note any quality problems on field data sheets, or in field logbooks. CDM 's PM will inform the project QA coordinator upon encountering quality issues that cannot be immediately corrected. Weekly reports and change request forms are not required for this work assignment.

Section 7

Data Validation and Usability

Laboratory results will be reviewed for compliance with project objectives. Data validation and evaluation are discussed in Sections 7.1 and 7.2, respectively.

7.1 Data Review, Validation, and Verification Requirements

Data review, validation, and verification will be performed for important investigative samples as described in the SWQAPP (CDM 2007b). Data validation, review, and verifications must be performed on sample results before distribution to the public for review. Requirements for the frequency of data review are initially set at 10%. This initial rate may be revised as initial samples are analyzed and results evaluated.

Data validation consists of examining the sample data package(s) against pre-determined standardized requirements. The validator may examine, as appropriate, the reported results, QC summaries, case narratives, COC information, raw data, initial and continuing instrument calibration, and other reported information to determine the accuracy and completeness of the data package. During this process, the validator will verify that the analytical methodologies were followed and QC requirements were met. The validator may recalculate selected analytical results to verify the accuracy of the reported information. Analytical results will then be qualified as necessary.

Data verification includes checking that results have been transferred correctly from laboratory data printouts to the laboratory report and to the EDD. Data verification for this project is primarily performed as a function of built-in quality control checks in the Libby project database when data is uploaded. However, the sample coordinator will notify the laboratories and the project database manager (Mr. Mark Raney, Volpe Center) of any discrepancies found during data usage.

7.2 Reconciliation with Data Quality Objectives

Once data has been generated, CDM evaluates data to determine if DQOs were achieved. This achievement will be discussed in the measurement report, including the data and any deviations to this SAP. Sample data will be maintained in the project database (Libby2). Laboratory QC sample data will be stored in hard copy (in the project files) and in Libby2.

Section 8

References

CDM. 2003. Final Sampling and Analysis Plan, Remedial Investigation, Libby Asbestos Site, Operable Unit 4. May 16.

_____. 2005. Quality Assurance Manual. July 7.

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_____. 2007a. Initial Soils Data Gap Analysis, Former Stimson Limber Mill, Operable Unit 5.

_____. 2007b. Site-Wide Quality Assurance Project Plan. Final date pending EPA review.

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EPA. 2001. EPA Requirements for Quality Assurance Project Plans, QA/R-5. Final. March.

_____. 2003a. Libby Asbestos Site, Residential/Commercial Cleanup Action Level and Clearance Criteria, Technical Memorandum. Draft Final. December 15.

_____. 2003b. Quality Assurance Project Plan, Performance Evaluation Study for Analytical Methods for Asbestos in Soil, Part B, Revision 1, Preparation of Performance Evaluation Samples. January 24.

_____. 2003c. Quality Assurance Project Plan for the Asbestos in Soil Performance Evaluation Study, Part C, Round-Robin Analysis of Performance Evaluation Samples. April.

_____. 2006. Guidance on Systematic Planning Using the Data Quality Objective Process, QA/G-4. February.



Figure 2-2
Former Stimson Lumber,
OU5 Location Map

Libby Asbestos Project
Libby, Montana

CDM



P:\03\64-Libby\Task Order 0006 - RI FS Support\Processing Areas\OU5 - Former Libby Lumber\SA\Initial Soils Gap SAP\Final\Figures\Figure 2-3 GW Superfund Site Location Map.mxd

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model, Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of August 2007.



Feet

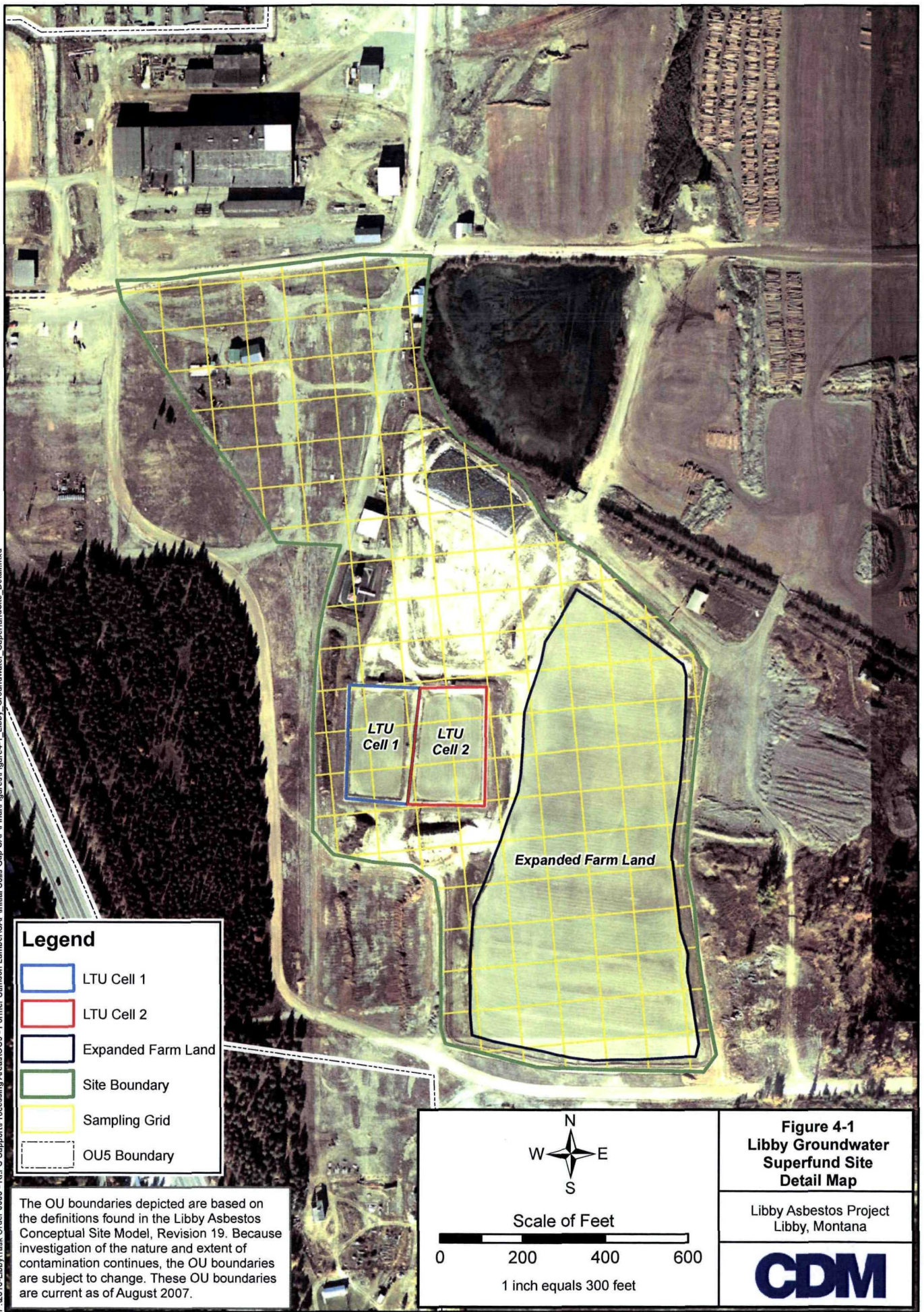
0 500 1,000 2,000

Figure 2-3
Libby Groundwater
Superfund Site
Location Map

Libby Asbestos Project
Libby, Montana

CDM

P:\2616-Libby\Task Order 0006 - RIFS Support\Processing Areas\OU5 - Former Stimson Lumber\SAP\Initial Soils Gap SAP\Final\Figures\Figure4-1 Libby Groundwater SuperfundSite Detail.mxd



Legend

- LTU Cell 1
- LTU Cell 2
- Expanded Farm Land
- Site Boundary
- Sampling Grid
- OU5 Boundary

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model, Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of August 2007.

W E
S

Scale of Feet

0 200 400 600

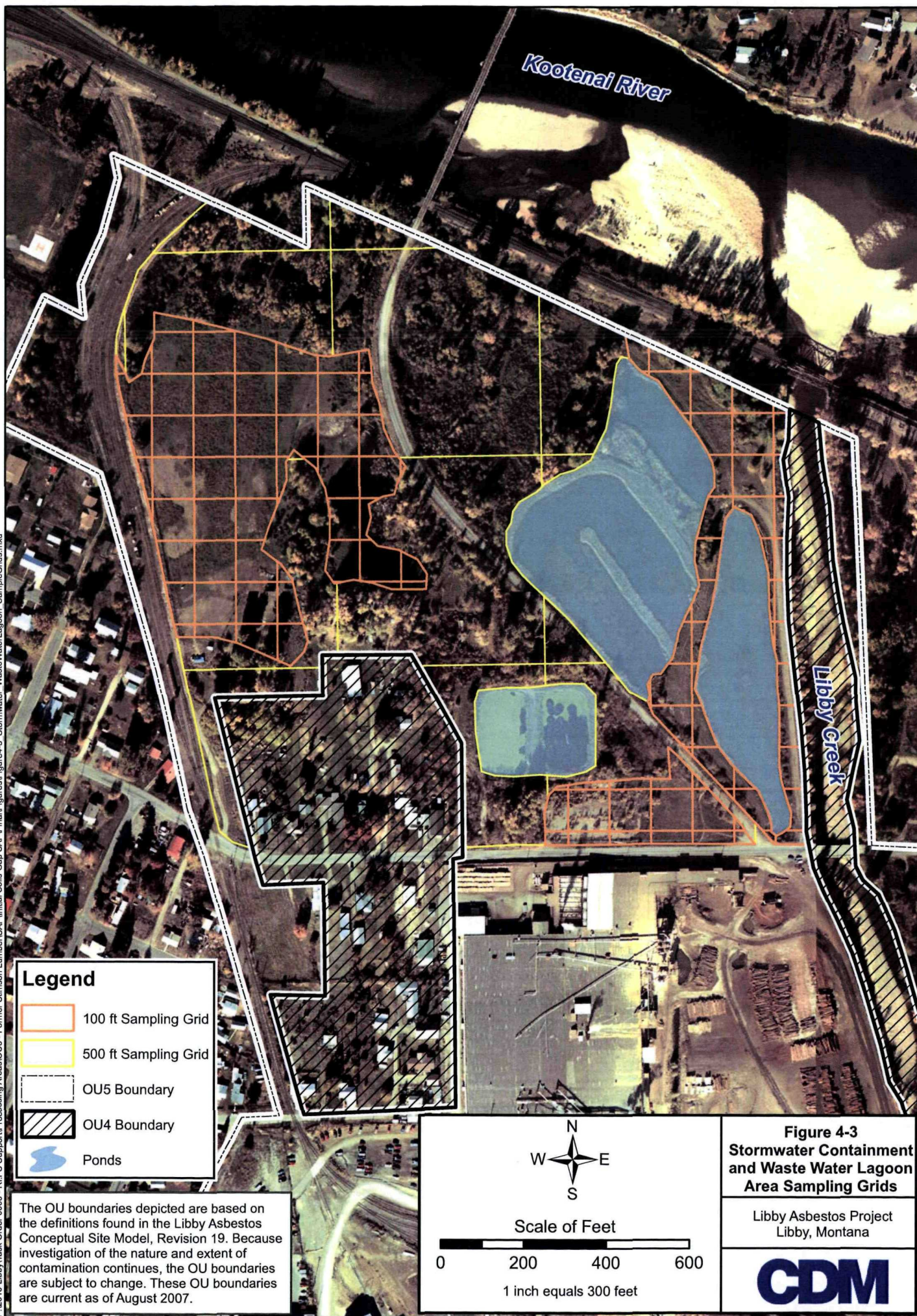
1 inch equals 300 feet

Figure 4-1
Libby Groundwater
Superfund Site
Detail Map

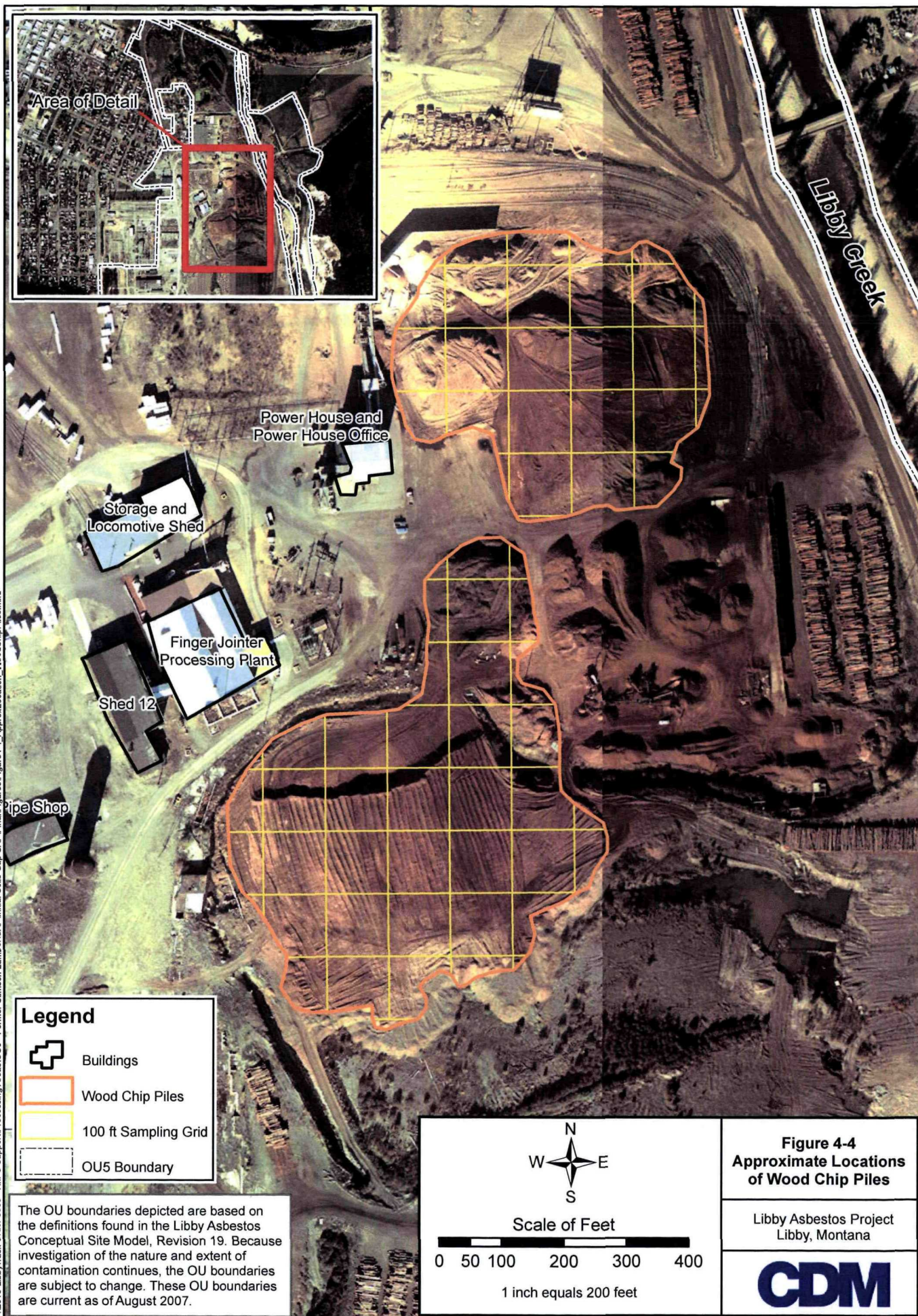
Libby Asbestos Project
Libby, Montana

CDM

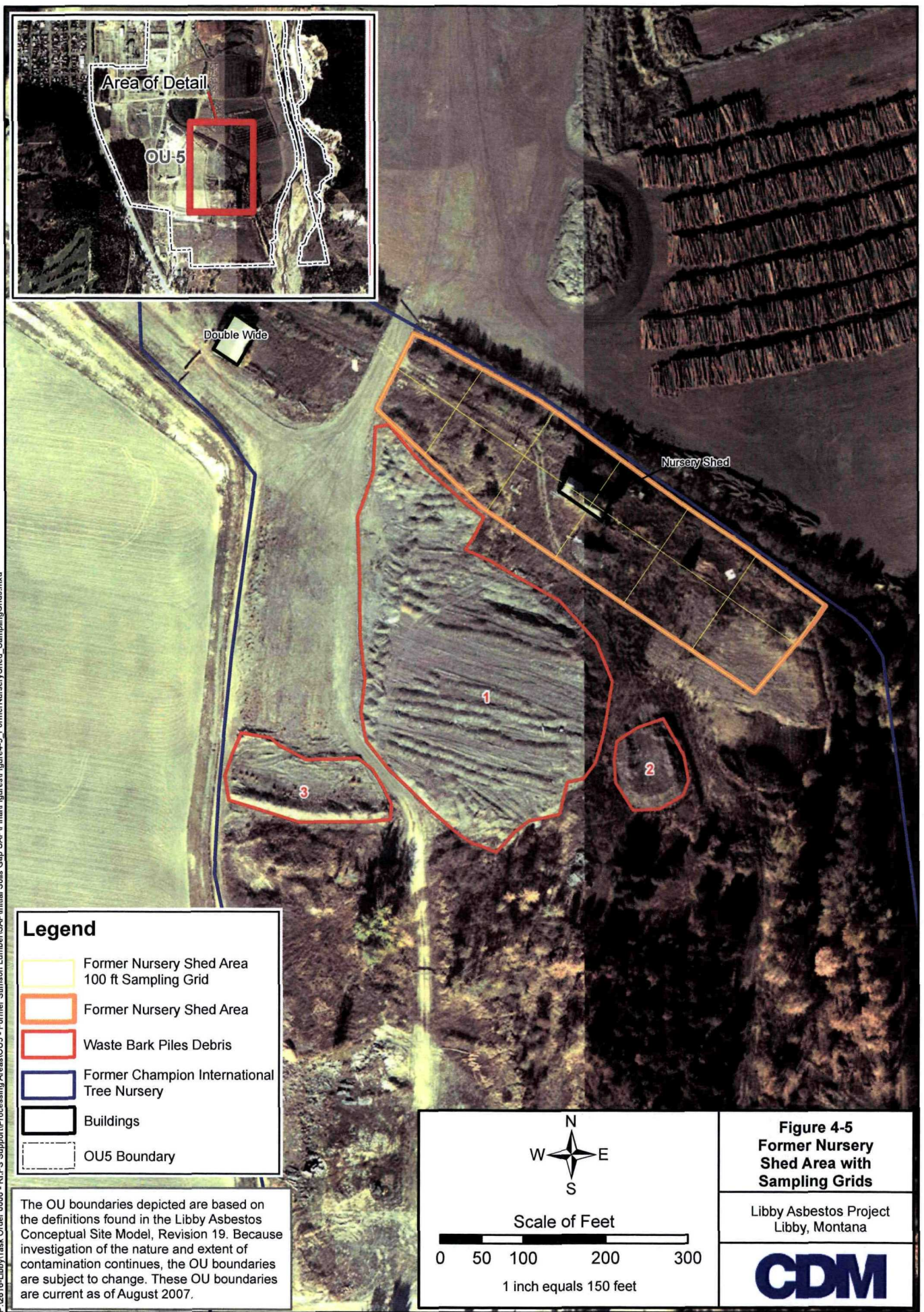




P:\2616-Libby\Task Order 0006 - RIFS Support\Processing Areas\OU5 - Former Simpson Lumber\SAP\Initial Soils Gap SAP\Final\Figure4-4_AproxLocation_WoodChipPiles.mxd



P:\2616-Libby\Task Order 0006 - RIFS Support\Processing Areas\OU5 - Former Stimson Lumber\SAP\Initial Soils Gap SAP\Final\Figures\Figure4-5 FormerNurseryShed SamplingGrids.mxd



Legend

- Former Nursery Shed Area
100 ft Sampling Grid
- Former Nursery Shed Area
- Waste Bark Piles Debris
- Former Champion International
Tree Nursery
- Buildings
- OU5 Boundary

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model, Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of August 2007.



Scale of Feet



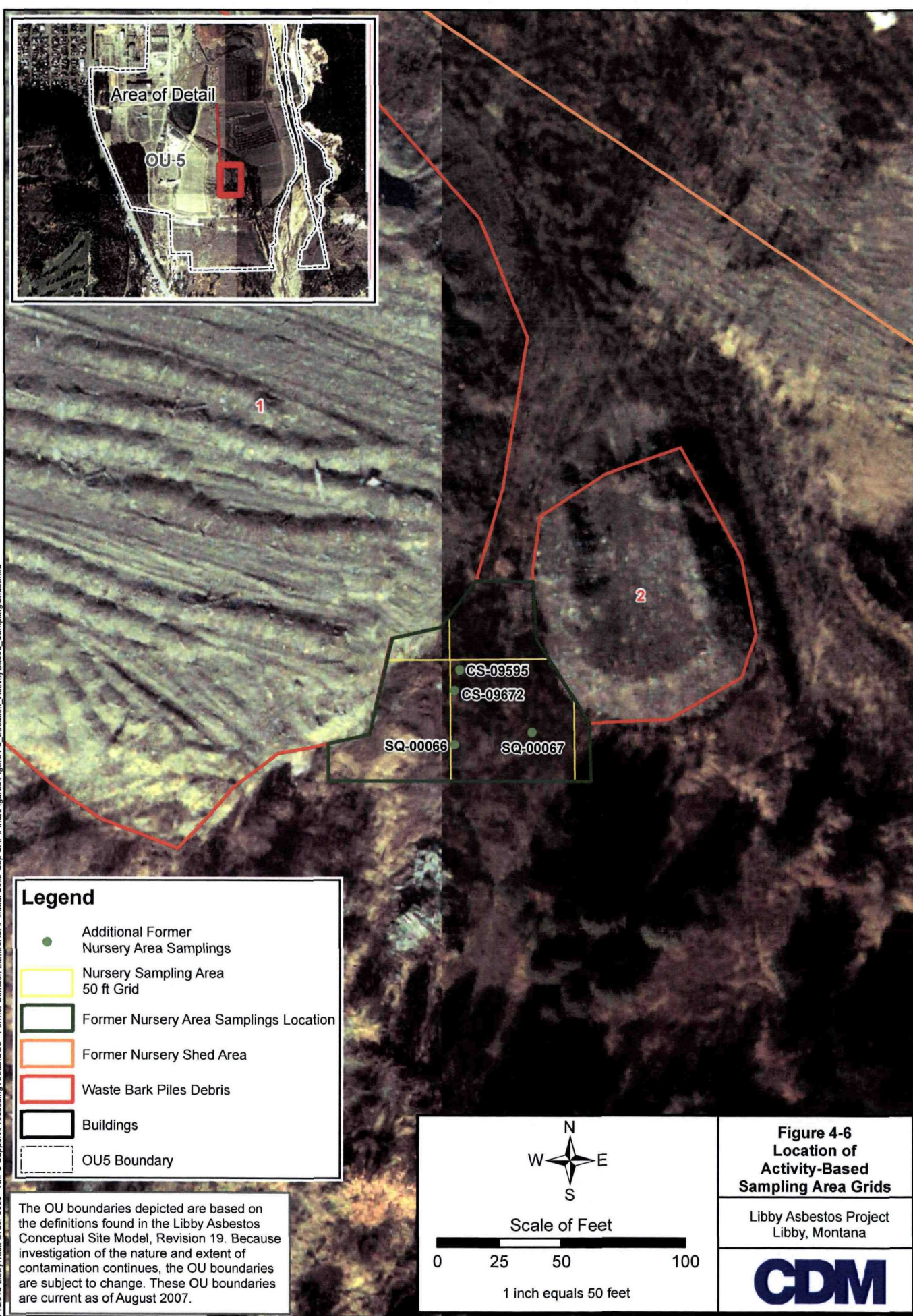
1 inch equals 150 feet

Figure 4-5
Former Nursery
Shed Area with
Sampling Grids

Libby Asbestos Project
Libby, Montana



P:\0616-Libby\Task Order 0006 - RFS Support\Processing Areas\OU5 - Former Stinson Lumber\SAP\Initial Soils Gap SAP\Final\Figures\Figure 4-6 Location, Activity Based, Sampling Grids.mxd

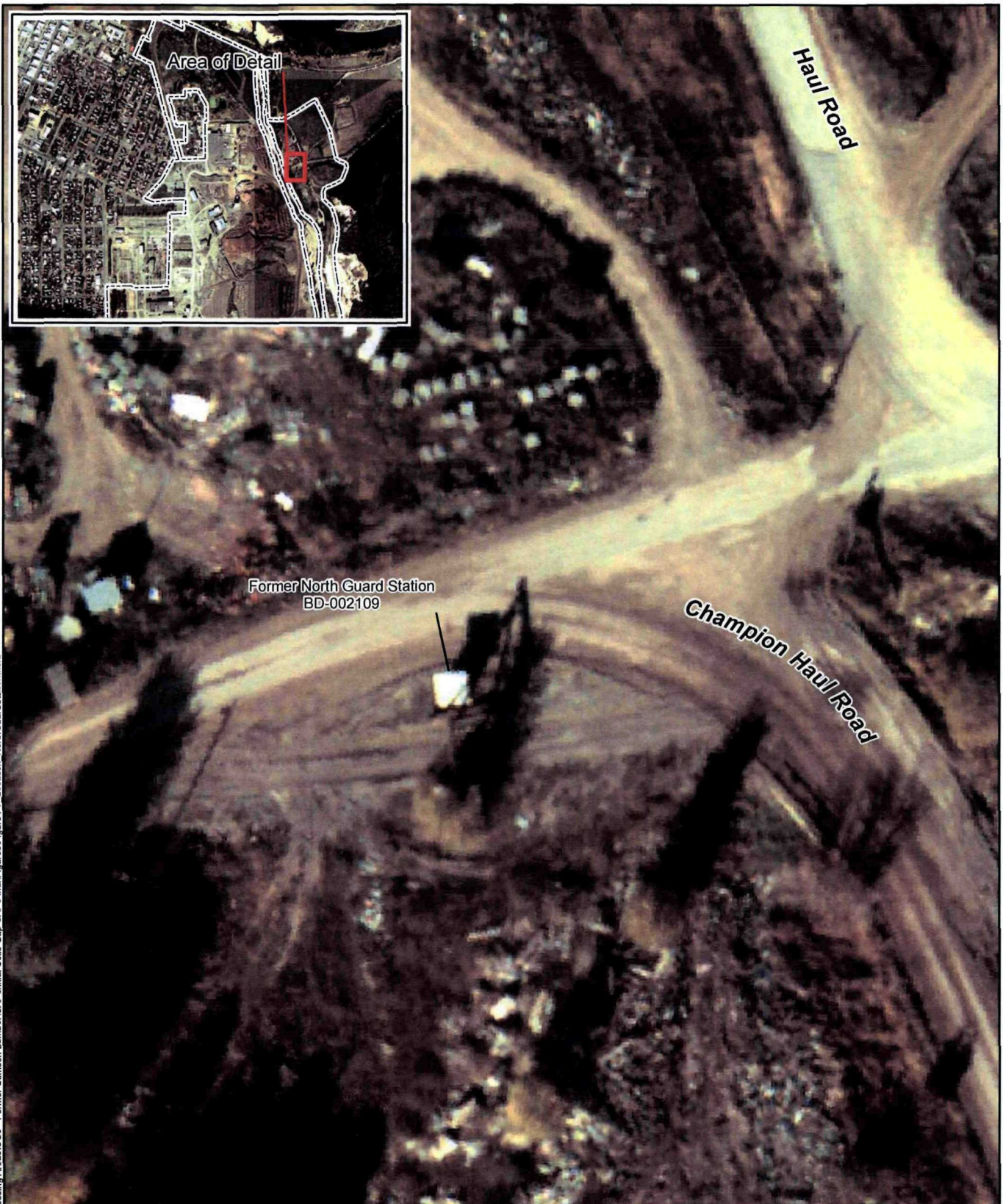


The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model, Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of August 2007.

Figure 4-6
Location of
Activity-Based
Sampling Area Grids

Libby Asbestos Project
Libby, Montana

CDM



P:\2016-LibbyTask Order 2006 - RIFS SupportProcessing Areas\OU5 - Former Stimson Lumber\SAP\Initial Soils Gap SAP\Final\Figures\Figure4-7 Location NorthGuardStation.mxd

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model, Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of August 2007.



Scale of Feet

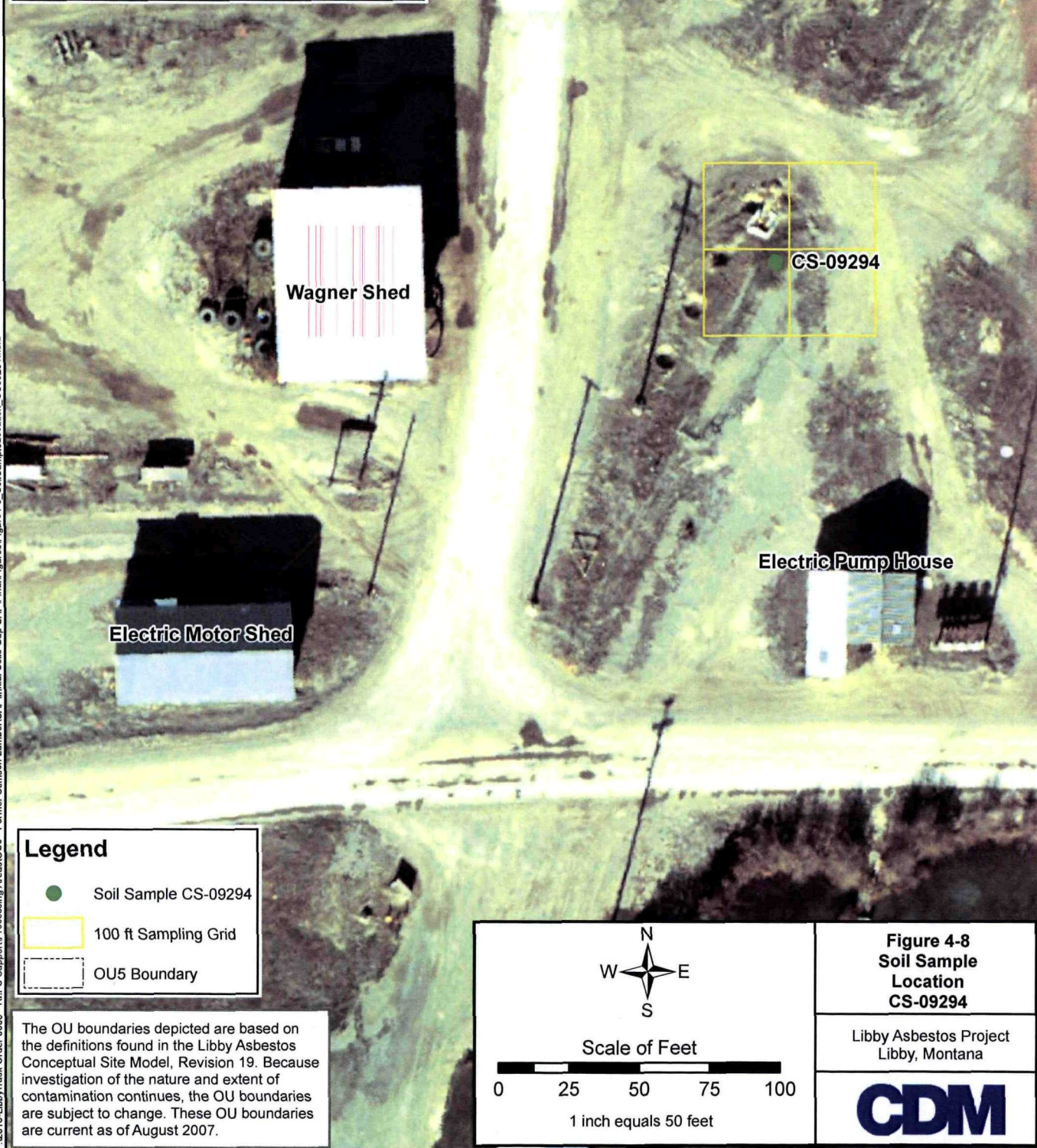
0 10 20 40 60 80

1 inch equals 40 feet

Figure 4-7
Location of Former
North Guard Station

Libby Asbestos Project
Libby, Montana

CDM



Legend

- Soil Sample CS-09294
- 100 ft Sampling Grid
- OU5 Boundary

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model, Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of August 2007.

Scale of Feet

0 25 50 75 100

1 inch equals 50 feet

Figure 4-8
Soil Sample Location
CS-09294

Libby Asbestos Project
Libby, Montana

P:\2616-Libby\Task Order 0006 - R\FS Support\Processing Areas\OU5 - Former Stimson Lumber\SAP\Initial Soils Gap SAP\Final\Figures\Figure 4-8 - Soil Sample Location CS09294.mxd

Table 4-1. OU5 Soil Sampling Summary

Location Description	Soil Sample Collection Frequency	Point Inspection Frequency	Figure Reference
Libby Groundwater Superfund Site	1 per 100 x 100 foot grid- surface	1 per 100 x 100 foot grid	Figure 4-1
	1 per 100 x 100 foot grid- subsurface (18 to 24 inches below ground surface) in LTU 1, LTU 2, and expanded land farm	1 per 100 x 100 foot grid	
Waste Bark Piles	Pile #1 one test pit, Pile #2 one test pit, Pile #3 one test pit per 100 x 100 foot grid	N/A	Figure 4-2
Former Nursery Shed Area	1 per 100 x 100 foot grid	Each sample aliquot	Figure 4-5
Former Nursery Area - Former Activity-Based Sampling Area	1 per 100 x 100 foot grid	Each sample aliquot	Figure 4-6
Banks of Libby Creek	1 per 400 linear feet each side of creek	Each sample aliquot	N/A
Storm Water Containment and Waste Water Lagoon Area	1 per 100 x 100 or 500 x 500 foot grid	1 per grid	Figure 4-3
Wood Chip Piles	IR reading, 3 per test pit, One test pit per 100 x 100 foot grid	N/A	Figure 4-4
Former Guard Station Near Libby Creek Bridge	1 in a 100 x 100 foot grid surrounding former location	Each sample aliquot	Figure 4-7
Diesel Pump House	1 in a 100 x 100 foot grid surrounding current location	Each sample aliquot	Figure 4-6
Soil Sample Location CS-09294	1 per 100 x 100 foot grid	Each sample aliquot	Figure 4-8

Table 4-2 Summary of Field QC Samples by Media

Media	Sample Type	Minimum Collection Frequency	Minimum Analysis Frequency	Acceptance Criteria	Acceptance Criteria Failure Action
Air	Lot Blank	1 per 500 cassettes	1 per 500 cassettes	ND for all asbestos	Rejection of all cassettes in lot
	Field Blank	1 per property per day	10% of total collected per week	ND for all asbestos fibers	Analysis of additional field blanks to determine source of potential cross-contamination, qualification of sample results, evaluation of field sample handling procedures
	Co-located	Not Required	0%	NA	Evaluation of sample collection techniques
Soil	Field Duplicate	1 per 20 samples	100%	<30% RPD	Evaluation of sample collection techniques

Notes: QC - quality control; ND - nondetect; RPD - relative percent difference; COC - chain of custody

Appendix A
Final Initial Soils Data Gap Analysis



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August 28, 2007

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Libby Asbestos Site Team Leader
U.S. Environmental Protection Agency
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1595 Wynkoop Street
Denver, Colorado 80202-1129

Ms. Katherine Hernandez
Remedial Project Manager
U.S. Environmental Protection Agency
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Mr. Mark Raney
U.S. Department of Transportation
Research and Innovative Technology Administration
John A. Volpe Center National Transportation Systems Center
Environmental Engineering Division, RTV-4E
55 Broadway, Kendall Square
Cambridge, Massachusetts 02142

Subject: Final Initial Data Gap Analysis for Soil, Former Stimson Lumber Site,
Operable Unit 5

Dear Mr. Peronard, Ms. Hernandez, and Mr. Raney,

The purpose of this letter is to identify initial gaps in soil sampling locations that are currently known to exist for the Former Stimson Lumber Site, Operable Unit (OU) 5. The samples identified for collection in this letter will help support the risk assessment and remedial investigation (RI) specific to OU5. The initial soil data gaps were determined by reviewing all existing data for the site as presented in the Draft Data Summary Report (DSR) dated May 2007. It is expected that additional soil sampling may be required in as the DSR and the conceptual site model (CSM) for this site are

finalized. Additional soil sampling efforts will be identified in a future data gap analysis that will address all media types requiring additional sample collection. It is further anticipated that a separate sampling event focused toward on-site buildings will be conducted if required. A data gap analysis, specific to all site buildings, will be performed prior to planning any building-focused sampling event.

This analysis is organized to identify data gaps by areas:

- Libby Groundwater Superfund Site
- Former Nursery Area Waste Bark Piles
- Banks of Libby Creek
- Storm Water Containment and Waste Water Lagoon Area
- Wood Chip Piles
- Known Areas of LA Containing Soils and/or Dust
 - Former Nursery Shed Area
 - Former Nursery Past Activity-Based Sampling Area
 - Former Guard Station Near Libby Creek
 - Diesel Pump House
 - Soil Sample Location CS-09294

All soil collection activities will be conducted in accordance with the most recent version of CDM-LIBBY-05 and estimates of visual vermiculite will be performed according to the most recent version of CDM-LIBBY-06.

Libby Groundwater Superfund Site

Past soil sampling activities were not conducted inside the boundary of the Libby Groundwater Superfund Site. To complete characterization of this area, it is recommended that soil sampling and evaluation for the presence of visible vermiculite within the boundary of the Libby Groundwater Superfund Site be conducted. For initial sample collection efforts, it is recommended that 30-point composite surface soil samples be collected from a 100 feet by 100 feet grid system in all areas except land treatment unit 1, land treatment unit 2, and the expanded landfarm. Using the 100 by 100 feet grid will result in the collection of approximately 140 surface soil samples in this area. Additional soil sampling efforts should be considered to collect subsurface samples from native soils found 18 to 24-inches below the existing surface in land treatment unit 1, land treatment unit 2, and the expanded landfarm. The soil layer undergoing treatment will be removed down to the native soil surface when remediation is determined to be completed.

Former Nursery Area Waste Bark Piles

To determine the removal options and potential future use of the waste bark debris piles, the material in the piles should be sampled and analyzed for a presence/absence of LA using the most recent version of ISSI-LIBBY-02, *Reflectance Spectroscopy Screening for Asbestos in Soils* (United States Geological Survey [USGS] 2002).

Test pits should be excavated from the surface to soil surface or a depth of 8 to 10 feet, whichever is encountered first, depending on the depth the excavator can safely reach. Test pits should be excavated on an approximate grid system with one pit excavated for every 10,000 square feet (100 feet x 100 feet grid system), resulting in approximately 10 test pits.

As part of this activity, personal air samples should be collected from the excavator operator and the operator of the portable IR equipment. These samples should be collected in accordance with the *Final SAP for Activity-Based Outdoor Air Exposures, Operable Unit 4, Libby, Montana, Superfund Site* (SRC and CDM 2007) and all approved modifications.

Once the waste bark debris piles are removed, soil sampling and visual vermiculite evaluation should be conducted in the areas that are currently under the piles. One 30-point composite surface soil sample should be collected from each 100 feet by 100 feet grid covering the 93,000 square feet currently occupied by the waste bark debris piles.

Banks of Libby Creek

The portion of Libby Creek that flows along the eastern boundary of the site should be visually assessed for the presence of vermiculite and other mine related materials as part of the Libby area creek investigation effort. In addition, it is recommended that one 30-point composite surface sample be collected from each side of the bank for every 400 linear feet. The sample should be collected from halfway between the top of the bank and the water level at the time of sample collection.

Storm Water Containment and Waste Water Lagoon Area

The previously unsampled area is bounded by rail lines on to the west and north, Libby Creek to the east and Fifth Street Extension to the South. Investigations in this area should include soil sampling and an evaluation for the presence of visible vermiculite on a 100 foot by 100 foot sampling grid.

Wood Chip Piles

Several wood bark piles are currently present in two areas to the south and east of the former power house, are currently being distributed to local residents for use as landscaping material. Using the USGS portable x-ray diffraction (XRD) method the presence/absence of LA in the wood chip piles will be determined.

Similar to the sampling planned for the waste bark piles in the former nursery area, test pits should be excavated from the surface to a depth of 8 to 10 feet depending on the depth the excavator can safely reach. One test pit should be excavated on a grid system with one pit excavated for every 10,000 square feet (100 feet x 100 feet grid system).

As part of this activity, personal air samples should be collected from the excavator operator and the operator of the portable IR equipment. These samples should be collected in accordance with the *Final SAP for Activity-Based Outdoor Air Exposures,*

Operable Unit 4, Libby, Montana, Superfund Site (SRC and CDM 2007) and all approved modifications.

Known Areas of LA Containing Soil and/or Dust

Fiver areas containing LA have been observed based on previous sampling efforts that should be re-sampled according to current site-protocols CDM-LIBBY-05 and CDM-LIBBY-06. The use of the current protocols will result in better delineation of these areas than was possible using past techniques.

Former Nursery Shed Area

Soil samples collected near and dust samples collected in the former nursery shed have shown high levels of detectable LA in previous sampling events. Therefore, additional soil sampling and a visual vermiculite evaluation should be conducted in this area. It is recommended that 30-point composite surface soil samples and visual estimation be performed on a grid system of 100 feet by 100 feet in this area.

Former Nursery Past Activity-Based Sampling Area

The second area is located near the center of the former nursery area and is situated around the previous sampling locations CS-09595, CS-09672, SQ-00067, and SQ-00066. LA results for all these samples indicate trace levels of LA. It is recommended that one 30-point composite surface soil sample be collected from each 100 feet by 100 feet grid centered around this area. Visual estimation for the presence of vermiculite should also be performed in this area.

Former Guard Station near Libby Creek Bridge

Past dust sampling of the former guard station near the Libby Creek Bridge at the former North Gate, indicated LA was present at concentrations of 44,116 structures per square centimeter. This sample result is based on a detection of one structure of LA; the elevated analytical result is due to a high analytical sensitivity for this sample, which is equal to the sample result. The guard station has been demolished since sample collection. To determine if LA is present in soils near the location of the former guard station, one 30-point composite surface soil sample should be collected from a 100 by 100 foot grid around the location of the former guard station. Visual estimation for the presence of vermiculite should also be performed in this area.

Diesel Pump House

The fourth area is located near the diesel pump house. Dust samples previously collected in this building indicated LA was present at a concentration of 8,832 structures per square centimeter. To determine if LA is present in soils near the pump house, one 30-point composite surface soil sample should be collected from a 100 by 100 foot grid centered on the location of pump house. Visual estimation for the presence of vermiculite should also be performed in this area.

Final Initial Data Gap Analysis for Soil - Former Stimson Lumber, OU5

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Soil Sample Location CS-09294

The location of soil sample CS-09294 is in the vicinity of the area currently used by the Luck E G Post & Rail Company. It is recommended that one 30-point composite surface soil samples should be collected from a 100 by 100 foot grid around the location of this former soil sample location to further evaluate and delineate LA presence in soils in this area. Visual estimation for the presence of vermiculite should also be performed in this area.

If you have any questions or concerns, please feel free to contact me at (720) 264-1121.

Very truly yours,

Dee Warren

CDM Federal Programs Corporation

Cc: Courtney Zamora, Volpe Center Site Manager

Anni Autio, CDM Processing Area Task Order Manager

Jeff Montera, CDM Project Manager

Appendix B
Standard Operating Procedures and Site-
Specific Guidance Documents

Project-Specific Modification

SOP No.: 1-2SOP Title: Sample CustodyProject: Libby Asbestos Remedial Investigation (RI)Project No.: 3282-137Client: U.S. Environmental Protection AgencyProject Manager:  Date: 5/7/03Technical Reviewer:  Date: 5/7/03QA Reviewer:  Date: 5/12/03EPA Approval:  Date: 5/19/03

NOTE: Each media (soil/dust) must be submitted on separate COC forms.

The sample coordinator assistant will use the FSDS to complete an electronic chain of custody (eCOC). The sample coordinator will check the data entered to create the eCOC against the FSDSs. Three paper copies of the eCOC will then be generated. One copy will be filed in the CDM Libby office and the other two will be sent with the samples. The sample coordinator will then check the eCOC versus the sample containers and sample shipment. The sample coordinator will be responsible for shipment of samples. If any errors are found on an eCOC after shipment, the paper copy of the COC will be corrected by the sample coordinator with a single strikeout initial and date. The corrected copy will be faxed to Volpe and the laboratory. The fax to Volpe will be used to update the Libby project database.

Reason for and duration of modification: Sample custody procedures for the Libby asbestos project vary slightly from SOP 1-2. These modifications are necessary for the entire duration of the project.

Project-Specific Modification

Via: Hand delivery or shipped. Hand delivery refers to samples delivered by hand to the onsite laboratory; shipped refers to samples sent to the laboratory by delivery service (i.e., Federal Express). To be completed by the sample coordinator.

Project: All samples collected in accordance with this sampling and analysis plan (SAP) are part of the CSS. Circle CSS. To be completed by the field team.

Sample Placed in Cooler/Bag: Refers to visual confirmation of the sample in the shipping container. To be completed by the sample coordinator.

Index ID: Unique index identification number used to identify sample, in the form CSS-####. To be completed by the field team.

Sample Date: The date each sample was collected, in the form MM/DD/YY. To be completed by the field team.

Sample Time: The time each sample was collected, in military time. To be completed by the field team.

Sample Matrix: The matrix of each sample collected, specific to the CSS; S = soil and W = water. To be completed by the field team.

Sample Type: Sample type of each sample collected; G = grab, C = composite. To be completed by the field team.

Volume: Specific to air and dust samples. Does not pertain to the CSS. "NA" should be placed in this field. To be completed by the field team.

Analysis Request: Analysis of each sample collected. All soil samples will be analyzed by IR. IR will be written in the analysis request portion of the COC form by the field team. The sample coordinator and/or laboratory coordinator may request SEM analysis based on Table 5-2 of the SAP. The sample coordinator and/or laboratory coordinator will designate IR for the appropriate samples.

Comments: Any pertinent information regarding the sample (i.e., vermiculite visible) will be entered by either the field team or the sample coordinator.

Sample Received by Lab: To be checked by the sample custodian at the laboratory upon receipt of the samples to confirm presence of each sample on the COC record.

Project-Specific Modification

Total Number of Samples: Total number of samples on the COC form. To be completed by the field team.

Additional Comments: Any additional comments that relate to samples on the COC form (i.e., turn around times). To be completed by the field team or sample coordinator.

Relinquished by: (1) Signed by field team member that relinquishes samples to sample coordinator and company of person relinquishing samples to sample coordinator (i.e., CDM). Date of relinquish shall be in the form MM/DD/YY and time shall be in military time. (2) Additional relinquished by lines to be completed following standard sample custody procedures.

Received by: (1) Signed by sample coordinator that receives samples from the sampling team and company of person accepting samples from the field teams (i.e., CDM). Date and time of acceptance should be the same as date and time of relinquish. (2) Additional received by lines to be completed following standard sample custody procedures.

Sample Condition upon Receipt: Will reflect the condition of samples at the relinquish time (i.e., accept ok or not acceptable with an explanation). To be completed by the person receiving samples.

Page ___ of ___: Sequential page number of the entire COC set sent to the laboratory. To be completed by the sample coordinator.

Sample Custody

SOP 1-2

Revision: 4

Date: March 1, 2004

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Prepared: David O. Johnson

Technical Review: Shelley Thibeault

QA Review: Laura Splichal

Approved: Michael C. Mally 2/24/04

Issued: [Signature] 2/18/04
Signature/Date

Signature/Date

1.0 Objective

Due to the evidentiary nature of samples collected during environmental investigations, possession must be traceable from the time the samples are collected until their derived data are introduced as evidence in legal proceedings. To maintain and document sample possession, sample custody procedures are followed. All paperwork associated with the sample custody procedures will be retained in CDM Federal Programs Corporation (CDM) files unless the client requests that it be transferred to them for use in legal proceedings or at the completion of the contract.

Note: Sample custody documentation requirements vary with the specific EPA region or client. This SOP is intended to present basic sample custody requirements, along with common options. Specific sample custody requirements should be presented in the project-specific quality assurance (QA) project plan or project-specific modification or clarification form (see Section U-1).

2.0 Background

2.1 Definitions

Sample - A sample is material to be analyzed that is contained in single or multiple containers representing a unique sample identification number.

Sample Custody - A sample is under custody if:

1. It is in your possession
2. It is in your view, after being in your possession
3. It was in your possession and you locked it up
4. It is in a designated secure area

Chain-of-Custody Record - A chain-of-custody record is a form used to document the transfer of custody of samples from one individual to another.

Custody Seal - A custody seal is a tape-like seal that is part of the chain-of-custody process and is used to detect tampering with samples after they have been packed for shipping.

Sample Label - A sample label is an adhesive label placed on sample containers to designate a sample identification number and other sampling information.

Sample Tag - A sample tag is attached with string to a sample container to designate a sample identification number and other sampling information. Tags may be used when it is difficult to physically place adhesive labels on the container (e.g., in the case of small air sampling tubes).

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3.0 Responsibilities

Sampler - The sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched.

Field Team Leader - The field team leader (FTL) is responsible for ensuring that strict chain-of-custody procedures are maintained during all sampling events. The FTL is also responsible for coordinating with the subcontractor laboratory to ensure that adequate information is recorded on custody records. The FTL determines whether proper custody procedures were followed during the fieldwork and decides if additional samples are required.

Field Sample Custodian - The field sample custodian, when designated by the FTL, is responsible for accepting custody of samples from the sampler(s) and properly packing and shipping the samples to the laboratory assigned to do the analyses. A field sample custodian is typically designated only for large and complex field efforts.

4.0 Required Supplies

- Chain-of-custody records (applicable client or CDM forms)
- Sample labels or tags
- Custody seals
- Clear tape

5.0 Procedures

5.1 Chain-of-Custody Record

This procedure establishes a method for maintaining custody of samples through use of a chain-of-custody record. This procedure will be followed for all samples collected or split samples accepted.

Field Custody

1. Collect only the number of samples needed to represent the media being sampled. To the extent possible, determine the quantity and types of samples and sample locations prior to the actual fieldwork. As few people as possible should handle samples.
2. Complete sample labels or tags for each sample using waterproof ink.
3. Maintain personal custody of the samples (in your possession) at all times until custody is transferred for sample shipment or directly to the analytical laboratory.

Transfer of Custody and Shipment

1. Complete a chain-of-custody record for all samples (see Figure 1 for an example of a chain-of-custody record. Similar forms may be used when requested by the client). When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the sample custodian in the appropriate laboratory.
 - The date/time will be the same for both signatures when custody is transferred directly to another person. When samples are shipped via common carrier (e.g., Federal Express), the

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date/time will not be the same for both signatures. Common carriers are not required to sign the chain-of-custody record.

- In all cases, it must be readily apparent that the person who received custody is the same person who relinquished custody to the next custodian.
- If samples are left unattended or a person refuses to sign, this must be documented and explained on the chain-of-custody record.

Note: If a field sample custodian has been designated, he/she may initiate the chain-of-custody record, sign, and date as the relinquisher. The individual sampler(s) must sign in the appropriate block, but does (do) not need to sign and date as a relinquisher (refer to Figure 1).

2. Package samples properly for shipment and dispatch to the appropriate laboratory for analysis. Each shipment must be accompanied by a separate chain-of-custody record. If a shipment consists of multiple coolers, samples in the coolers may be recorded on a single chain-of-custody record.
3. The original record will accompany the shipment, and the copies will be retained by the FTL and, if applicable, distributed to the appropriate sample coordinators. Freight bills will also be retained by the FTL as part of the permanent documentation. The shipping number from the freight bill shall be recorded on the applicable chain-of-custody record.

Procedure for Completing CDM Example Chain-of-Custody Record

The following procedure is to be used to fill out the CDM chain-of-custody record. The record provided herein (Figure 1) is an example chain-of-custody record. If another type of custody record (i.e., provided by the EPA contract laboratory program or a subcontract laboratory) is used to track the custody of samples, the custody record should be filled out in its entirety.

1. Record project number.
2. Record FTL for the project (if a field sample custodian has been designated, also record this name in the "Remarks" box).
3. Record the name and address of the laboratory to which samples are being shipped.
4. Enter the project name/location or code number.
5. Record overnight courier's airbill number.
6. Record sample location number.
7. Record sample number.
8. Note preservatives added to the sample.
9. Note media type (matrix) of the sample.
10. Note sample type (grab or composite).
11. Enter date of sample collection.
12. Enter time of sample collection in military time.

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Figure 1
Example CDM Chain-of-Custody Record

CDM

125 Maiden Lane, 5th Floor
New York, NY 10038
(212) 785-9123
Fax: (212) 785-6114

CHAIN OF CUSTODY RECORD

PROJECT ID.		FIELD TEAM LEADER		LABORATORY AND ADDRESS				DATE SHIPPED															
PROJECT NAME/LOCATION				LAB CONTRACT:				AIRBILL NO.															
MEDIA TYPE 1. Surface Water 2. Groundwater 3. Leachate 4. Field QC 5. Soil/Sediment 6. QI 7. Waste 8. Other _____		PRESERVATIVES 1. HCl, pH <2 2. HNO ₃ , pH <2 3. NaOH, pH >12 4. H ₂ SO ₄ , pH <2 5. Zinc Acetate, pH >9 6. Ice Only 7. Not Preserved 8. Other _____		SAMPLE TYPE G = Grab C = Composite		ANALYSES (List no. of containers submitted)																	
SAMPLE LOCATION NO.		LABORATORY SAMPLE NUMBER		PRESERVATIVES ADDED								MEDIA TYPE		SAMPLE TYPE		DATE		TIME		SAMPLED		REMARKS (Note if MS/MSD)	
1.																							
2.																							
3.																							
4.																							
5.																							
6.																							
7.																							
8.																							
9.																							
10.																							
SAMPLER SIGNATURES:																							
RELINQUISHED BY: (PRINT)				DATE/TIME		RECEIVED BY: (PRINT)				DATE/TIME		RELINQUISHED BY: (PRINT)				DATE/TIME		RECEIVED BY: (PRINT)				DATE/TIME	
(SIGN)						(SIGN)						(SIGN)						(SIGN)					
RELINQUISHED BY: (PRINT)				DATE/TIME		RECEIVED BY: (PRINT)				DATE/TIME		RELINQUISHED BY: (PRINT)				DATE/TIME		RECEIVED BY: (PRINT)				DATE/TIME	
(SIGN)						(SIGN)						(SIGN)						(SIGN)					
COMMENTS:																							

DISTRIBUTION: White and yellow copies accompany sample shipment to laboratory; yellow copy retained by laboratory; Pink copy retained by samplers.

1/98

Note: If requested by the client, different chain-of-custody records may be used. Copies of the template for this record may be obtained from the Chantilly Graphics Department.

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13. When required by the client, enter the names or initials of the samplers next to the sample location number of the sample they collected.
14. List parameters for analysis and the number of containers submitted for each analysis.
15. Enter matrix spike/matrix spike duplicate (MS/MSD) if sample is for laboratory quality control or other remarks (e.g., sample depth).
16. Sign the chain-of-custody record(s) in the space provided. All samplers must sign each record.
17. If sample tags are used, record the sample tag number in the "Remarks" column.
18. The originator checks information entered in Items 1 through 16 and then signs the top left "Relinquished by" box, prints his/her name, and enters the current date and time (military).
19. Send the top two copies (usually white and yellow) with the samples to the laboratory; retain the third copy (usually pink) for the project files. Retain additional copies for the project file or distribute as required to the appropriate sample coordinators.
20. The laboratory sample custodian receiving the sample shipment checks the sample label information against the chain-of-custody record. Sample condition is checked and anything unusual is noted under "Remarks" on the chain-of-custody record. The laboratory custodian receiving custody signs in the adjacent "Received by" box and keeps the copy. The white copy is returned to CDM.

5.2 Sample Labels and Tags

Unless the client directs otherwise, sample labels or tags will be used for all samples collected or accepted for CDM projects.

1. Complete one label or tag with the information required by the client for each sample container collected. A typical label or tag would be completed as follows (see Figure 2 for example of sample tag; labels are completed with the equivalent information):
 - Record the project code (i.e., project or task number).
 - Enter the station number (sample number) if applicable.
 - Record the date to indicate the month, day, and year of sample collection.
 - Enter the time (military) of sample collection.
 - Place a check to indicate composite or grab sample.
 - Record the station (sample) location.
 - Sign in the space provided.
 - Place a check next to "yes" or "no" to indicate if a preservative was added.
 - Place a check under "Analyses" next to the parameters for which the sample is to be analyzed. If the desired analysis is not listed, write it in the empty slot. Note: Do not write in the box for "laboratory sample number."
 - Place or write additional relevant information under "Remarks."
2. Place adhesive labels directly on the sample containers. Place clear tape over the label to protect from moisture.
3. Securely attach sample tags to the sample bottle. On 2.27 liter (80 oz.) amber bottles, the tag string may be looped through the ring style handle and tied. On all other containers, it is

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Figure 2
Example Sample Tag

Designate		Grab	Comp.	Time	Month/Day/Year	Station No.	Project Code	Station Location	Preservative: Yes <input type="checkbox"/> No <input type="checkbox"/>	
									ANALYSES	
									BOD	Anions
									Solids	(mg) (mg) (mg)
									COD, TOC, Nutrients	
									Phenolics	
									Mercury	
									Metals	
									Cyanide	
									Oil and Grease	
									Organics GC/MS	
									Priority Pollutants	
									Volatile Organics	
									Pesticides	
									Mutagenicity	
									Bacteriology	
									Remarks:	
									Tag No. Lab Sample No.	
									3-3023215	

Note: Equivalent sample labels or tags may be used.

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recommended that the string be looped around the neck of the bottle, then twisted and re-looped around the neck until the slack in the string is removed.

4. Double-check that the information recorded on the sample tag is consistent with the information recorded on the chain-of-custody record.

5.3 Custody Seals

Two custody seals must be placed on opposite corners of all shipping containers (e.g., cooler) prior to shipment. The seals should be signed and dated by the shipper.

Custody seals may also be placed on individual sample bottles. Check with the client or refer to EPA regional guidelines for direction.

5.4 Sample Shipping

The CDM standard operating procedure listed below defines the requirements for packaging and shipping environmental samples.

- CDM Federal SOP 2-1, Packaging and Shipping Environmental Samples

6.0 Restrictions/Limitations

Check with the EPA region or client for specific guidelines. If no specific guidelines are identified, this procedure should be followed.

For EPA Contract Laboratory Program (CLP) sampling events, combined chain-of-custody/traffic report forms or other EPA-specific records may be used. Refer to regional guidelines for completing these forms.

The EPA FORMS II Lite™ software may be used to customize sample labels and custody records when directed by the client or the CDM project manager.

7.0 References

U.S. Environmental Protection Agency, *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA/600/R-98/018, February 1998, Section B3.

U.S. Environmental Protection Agency, *National Enforcement Investigations Center, Multi-Media Investigation Manual*, EPA-330/9-89-003-R, Revised March 1992, p.85.

U.S. Environmental Protection Agency, *Contract Laboratory Program (CLP), Guidance for Field Samplers*, EPA-540-R-00-003, Draft Final, June 2001, Section 3.2.

U.S. Environmental Protection Agency, *FORMS II Lite™ User's Guide*, March 2001.

U.S. Environmental Protection Agency, Region IV, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, May 1996, Section 3.3.

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plan*, EM 200-1-3, February 2001, Appendix F.

Project-Specific Modification

SOP No.: 2-1

SOP Title: Packaging and Shipping of Environmental Samples

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: [Signature]

Date: 5/7/03

Technical Reviewer: [Signature]

Date: 5/7/03

QA Reviewer: [Signature]

Date: 5/12/03

EPA Approval: [Signature]

Date: 5/19/03

Reason for and duration of modification: Procedures for shipping environmental samples for the Libby asbestos project vary slightly from CDM Technical SOP 2-1. These modifications are necessary for the entire duration of the project.

Samples collected during this investigation will be packaged and shipped in accordance with CDM Technical SOP 2-1, with the following modifications:

Section 1.4, Required Equipment - Vermiculite (or other absorbent material), bubble wrap, or ice will not be used for packaging or shipping samples.

Section 1.5, Procedures - No vermiculite or other absorbent material will be used to pack the samples. No ice will be used.

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Prepared: Krista Lippoldt

Technical Review: Chuck Myers

QA Review: Douglas J. Updike

Approved: Michael C. Mally 2/24/04

Signature/Date

Issued: [Signature] 2/18/04

Signature/Date

1.0 Packaging and Shipping of All Samples

This standard operating procedure (SOP) applies to the packaging and shipping of all environmental samples. If the sample is preserved or radioactive, the following sections may also be applicable.

Section 2.0 - Packaging and Shipping Samples Preserved with Methanol

Section 3.0 - Packaging and Shipping Samples Preserved with Sodium Hydroxide

Section 4.0 - Packaging and Shipping Samples Preserved with Hydrochloric Acid

Section 5.0 - Packaging and Shipping Samples Preserved with Nitric Acid

Section 6.0 - Packaging and Shipping Samples Preserved with Sulfuric Acid

Section 7.0 - Packaging and Shipping Limited-Quantity Radioactive Samples

1.1 Objective

The objective of this SOP is to outline the requirements for the packaging and shipment of environmental samples. Additionally, Sections 2.0 through 7.0 outline requirements for the packaging and shipping of regulated environmental samples under the Department of Transportation (DOT) Hazardous Materials Regulations, the International Air Transportation Association (IATA), and International Civil Aviation Organization (ICAO) Dangerous Goods Regulations for shipment by air and applies only to domestic shipments. This SOP does not cover the requirements for packaging and shipment of equipment (including data loggers and self-contained breathing apparatus [SCBAs] or bulk chemicals that are regulated under the DOT, IATA, and ICAO.

1.2 Background

1.2.1 Definitions

Environmental Sample - An aliquot of air, water, plant material, sediment, or soil that represents the contaminant levels on a site. Samples of potential contaminant sources, like tanks, lagoons, or non-aqueous phase liquids are normally not "environmental" for this purpose. This procedure applies only to environmental samples that contain less than reportable quantities for any foreseeable hazardous constituents according to DOT regulations promulgated in 49 CFR - Part 172.101 Appendix A.

Custody Seal - A custody seal is a narrow adhesive-backed seal that is applied to individual sample containers and/or the container (i.e., cooler) before offsite shipment. Custody seals are used to demonstrate that sample integrity has not been compromised during transportation from the field to the analytical laboratory.

Inside Container - The container, normally made of glass or plastic, that actually contacts the shipped material. Its purpose is to keep the sample from mixing with the ambient environment.

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Outside Container - The container, normally made of metal or plastic, that the transporter contacts. Its purpose is to protect the inside container.

Secondary Containment - The outside container provides secondary containment if the inside container breaks (i.e., plastic overpackaging if liquid sample is collected in glass).

Excepted Quantity - Excepted quantities are limits to the mass or volume of a hazardous material in the inside and outside containers below which DOT, IATA, ICAO regulations do not apply. The excepted quantity limits are very low. Most regulated shipments will be made under limited quantity.

Limited Quantity - Limited quantity is the maximum amount of a hazardous material below which there are specific labeling or packaging exceptions.

Performance Testing - Performance testing is the required testing of outer packaging. These tests include drop and stacking tests.

Qualified Shipper - A qualified shipper is a person who has been adequately trained to perform the functions of shipping hazardous materials.

1.2.2 Discussion

Proper packaging and shipping is necessary to ensure the protection of the integrity of environmental samples shipped for analysis. These shipments are potentially subject to regulations published by DOT, IATA, or ICAO. Failure to abide by these rules places both CDM and the individual employee at risk of serious fines. The analytical holding times for the samples must not be exceeded. The samples should be packed in time to be shipped for overnight delivery. Make arrangements with the laboratory before sending samples for weekend delivery.

1.2.3 Associated Procedure

- CDM Federal SOP 1-2, Sample Custody

1.3 Required Equipment

- Coolers with return address of the appropriate CDM office
- Heavy-duty plastic garbage bags
- Plastic zip-type bags, small and large
- Clear tape
- Nylon reinforced strapping tape
- Duct tape
- Vermiculite (or an equivalent nonflammable material that is inert and absorbent)*
- Bubble wrap (optional)
- Ice
- Custody seals
- Completed chain-of-custody record or contract laboratory program (CLP) custody records, if applicable
- Completed bill of lading
- "This End Up" and directional arrow labels

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- * Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials.

1.4 Packaging Environmental Samples

The following steps must be followed when packing sample bottles and jars for shipment:

1. Verify the samples undergoing shipment meet the definition of "environmental sample" and are not a hazardous material as defined by DOT. Professional judgment and/or consultation with qualified persons such as the appropriate health and safety coordinator or the health and safety manager should be observed.
2. Select a sturdy cooler in good repair. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler. Line the cooler with a large heavy-duty plastic garbage bag.
3. Be sure the caps on all bottles are tight (will not leak); check to see that labels and chain-of-custody records are completed properly (SOP 1-2, Sample Custody).
4. Place all bottles in separate and appropriately sized plastic zip-top bags and close the bags. Up to three VOA vials may be packed in one bag. Binding the vials together with a rubber band on the outside of the bag, or separating them so that they do not contact each other, will reduce the risk of breakage. Bottles may be wrapped in bubble wrap. Optionally, place three to six VOA vials in a quart metal can and then fill the can with vermiculite or equivalent. Note: Trip blanks must be included in coolers containing VOA samples.
5. Place 2 to 4 inches of vermiculite (or equivalent) into a cooler that has been lined with a garbage bag, and then place the bottles and cans in the bag with sufficient space to allow for the addition of packing material between the bottles and cans. It is preferable to place glass sample bottles and jars into the cooler vertically. Glass containers are less likely to break when packed vertically rather than horizontally.
6. While placing sample containers into the cooler, conduct an inventory of the contents of the shipping cooler against the chain-of-custody record. The chain-of-custody with the cooler should reflect only those samples within the cooler.
7. Put ice in large plastic zip-top bags (double bagging the zip-tops is preferred) and properly seal. Place the ice bags on top of and/or between the samples. Several bags of ice are required (dependant on outdoor temperature, staging time, etc.) to maintain the cooler temperature at approximately 4° Celsius (C) if the analytical method requires cooling. Fill all remaining space between the bottles or cans with packing material. Securely fasten the top of the large garbage bag with fiber or duct tape.
8. Place the completed chain-of-custody record or the CLP traffic report form (if applicable) for the laboratory into a plastic zip-top bag, seal the bag, tape the bag to the inner side of the cooler lid and close the cooler.

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9. The cooler lid shall be secured with nylon reinforced strapping tape by wrapping each end of the cooler a minimum of two times. Attach a completed chain-of-custody seal across the opening of the cooler on opposite sides. The custody seals should be affixed to the cooler with half of the seal on the strapping tape so that the cooler cannot be opened without breaking the seal. Complete two more wraps around with fiber tape and place clear tape over the custody seals.
10. The shipping container lid must be marked "THIS END UP" and arrow labels that indicate the proper upward position of the container should be affixed to the cooler. A label containing the name and address of the shipper (CDM) shall be placed on the outside of the container. Labels used in the shipment of hazardous materials (such as Cargo Only Air Craft, Flammable Solids, etc.) are not permitted on the outside of containers used to transport environmental samples and shall not be used. The name and address of the laboratory shall be placed on the container, or when shipping by common courier, the bill of lading shall be completed and attached to the lid of the shipping container.

2.0 Packaging and Shipping Samples Preserved with Methanol

2.1 Containers

- The maximum volume of methanol in a sample container is limited to 30 ml.
- The sample container must not be full of methanol.

2.2 Responsibility

It is the responsibility of the qualified shipper to:

- Ensure that the samples undergoing shipment contain no other contaminant that meets the definition of "hazardous material" as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

2.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Inner packing may consist of glass or plastic jars
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test
- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 3 flammable liquid labels
- Orientation labels
- Consignor/consignee labels

2.4 Packaging Samples Preserved with Methanol

The following steps are to be followed when packaging limited-quantity sample shipments.

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling.

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- At a minimum the label must contain:
 - Project name
 - Project number
 - Date and time of sample collection
 - Sample location
 - Sample identification number
 - Collector's initials
 - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- Wrap each container (40-ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place wrapped containers inside a polyethylene bottle filled with vermiculite; seal the bottle. (Maximum of 4 VOA vials will fit inside a 500-ml wide-mouth polyethylene bottle.)
- Total volume of methanol per shipping container must not exceed 500 ml.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tying or taping.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

Methanol Mixture
UN1230
LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Flammable Liquid label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

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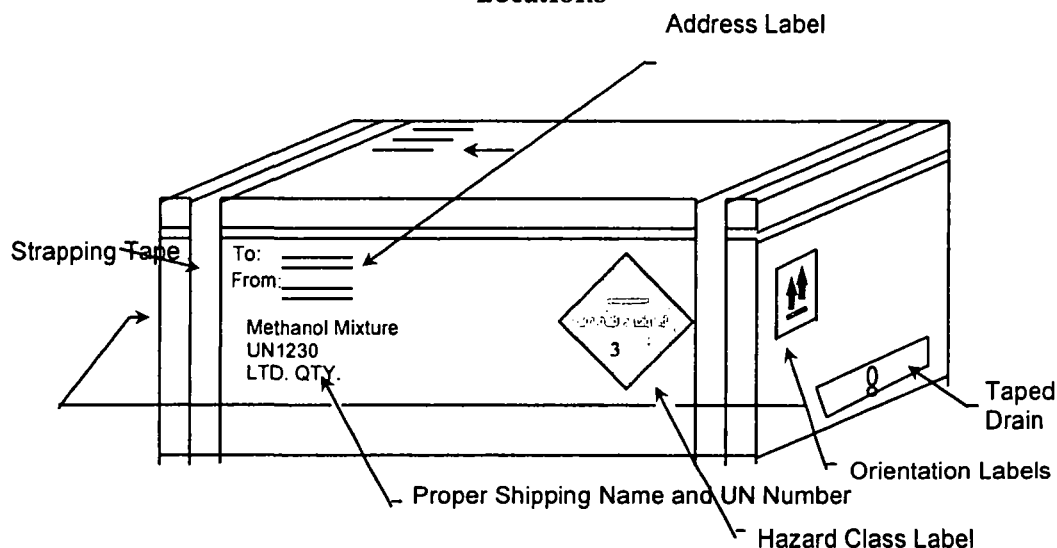
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Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other non-regulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

**Figure 1 - Example of Cooler Label/Marking
Locations**



3.0 Packaging and Shipping Samples Preserved with Sodium Hydroxide

3.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Sodium Hydroxide Preservatives

Preservative		Desired in Final Sample		Quantity of Preservative (ml) for Specified Container				
		pH	Conc.	40 ml	125 ml	250 ml	500 ml	1 L
NaOH	30%	>12	0.08%		.25	0.5	1	2

5 drops = 1 ml

3.2 Responsibility

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made.

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3.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test
- Inner packings may consist of glass or plastic jars no larger than 1 pint
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

3.4 Packaging Samples Preserved with Sodium Hydroxide

Samples containing NaOH as a preservative that exceed the excepted concentration of 0.08 percent (2 ml of a 30 percent NaOH solution per liter) may be shipped as a limited quantity per packing instruction Y819 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity samples shipments.

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling.
- At a minimum the label must contain:
 - Project name
 - Project number
 - Date and time of sample collection
 - Sample location
 - Sample identification number
 - Collector's initials
 - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- This step is optional; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place glass containers inside a polyethylene bottle filled with vermiculite; seal the bottle.
- The total volume of sample in each cooler must not exceed 1 liter.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tying or taping.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.

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- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

Sodium Hydroxide Solution
UN1824
LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marketing locations is shown in Figure 1.

Note: Samples meeting the exception concentration of 0.08 percent NaOH by weight may be shipped as non-regulated or non-hazardous following the procedure in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other non-regulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

4.0 Packaging and Shipping Samples Preserved with Hydrochloric Acid

4.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

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Excepted Quantities of Hydrochloric Acid Preservatives

Preservative		Desired in Final Sample		Quantity of Preservative (ml) for Specified Container		
		pH	Conc.	40 ml	125 ml	250 ml
HCl	2N	<1.96	0.04%	.2	.5	1

5 drops = 1 ml

4.2 Responsibility

It is the responsibility of the qualified shipper to:

- Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

4.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3.

- Inner packing may consist of glass or plastic jars no larger than 1 pint.
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

4.4 Packaging Samples Preserved with Hydrochloric Acid

The following steps are to be followed when packaging limited-quantity sample shipments.

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling.
- At a minimum the label must contain:
 - Project name
 - Project number
 - Date and time of sample collection
 - Sample location
 - Sample identification number
 - Collector's initials
 - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- Wrap each container (40-ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place wrapped containers inside a polyethylene bottle filled with vermiculite; seal the bottle. (No more than 4 VOA vials will fit inside a 500-ml wide-mouth polyethylene bottle.)

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- Total volume of sample inside each cooler must not exceed 1 liter.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tying or taping.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

Hydrochloric Acid Solution
UN1789
LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: Samples containing less than the exception concentration of 0.04 percent HCl by weight will be shipped as non-regulated or non-hazardous following the procedure in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other non-regulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.

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- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

5.0 Packaging and Shipping Samples Preserved with Nitric Acid

5.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Nitric Acid Preservatives

<i>Preservative</i>		<i>Desired in Final Sample</i>		<i>Quantity of Preservative (ml) for Specified Container</i>				
		pH	Conc.	40 ml	125 ml	250 ml	500 ml	1 L
HNO ₃	6N	<1.62	0.15%		2	4	5	8

5 drops = 1 ml

5.2 Responsibility

It is the responsibility of the qualified shipper to:

- Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

5.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3.

- Inner packings may consist of glass or plastic jars no larger than 100 ml.
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

5.4 Packaging Samples Preserved with Nitric Acid

Samples containing HNO₃ as a preservative that exceed the excepted concentration of 0.15 percent HNO₃ will be shipped as a limited quantity per packing instruction Y807 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity sample shipments.

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling.
- At a minimum the label must contain:
 - Project name

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- Project number
- Date and time of sample collection
- Sample location
- Sample identification number
- Collector's initials
- Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody)
- This step is optional; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place glass containers inside a polyethylene bottle filled with vermiculite; seal the bottle.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tying or taping.
- The maximum volume of preserved solution in the cooler must not exceed 500 ml.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

Nitric Acid Solution (with less than 20 percent)

UN2031

Ltd. Qty.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marketing locations is shown in Figure 1.

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Note: Samples meeting the exception concentration of 0.15 percent HNO_3 by weight will be shipped as non-regulated or non-hazardous following the procedure in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other non-regulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

6.0 Packaging and Shipping Samples Preserved with Sulfuric Acid

6.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Sulfuric Acid Preservatives

<i>Preservative</i>		<i>Desired in Final Sample</i>		<i>Quantity of Preservative (ml) for Specified Container</i>				
		pH	Conc.	40 ml	125 ml	250 ml	500 ml	1 L
H_2SO_4	37N	<1.15	0.35%	.1	.25	0.5	1	2

5 drops = 1 ml

6.2 Responsibility

It is the responsibility of the qualified shipper to:

- Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

6.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3.

- Inner packings may consist of glass or plastic jars no larger than 100 ml.
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

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6.4 Packaging of Samples Preserved with Sulfuric Acid

Samples containing H_2SO_4 as a preservative that exceed the excepted concentration of 0.35 percent will be shipped as a limited quantity per packing instruction Y809 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity samples shipments.

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling.
- At a minimum the label must contain:
 - Project name
 - Project number
 - Date and time of sample collection
 - Sample location
 - Sample identification number
 - Collector's initials
 - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- Wrap each glass container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place glass containers inside a polyethylene bottle filled with vermiculite; seal the bottle.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tying or taping.
- The maximum volume of preserved solution in the cooler must not exceed 500 ml.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

Sulfuric Acid Solution
UN2796
LTD. QTY.

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- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: Samples containing less than the exception concentration of 0.35 percent H_2SO_4 by weight will be shipped as non-regulated or non-hazardous in accordance with the procedure described in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other non-regulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

7.0 Packaging and Shipping Limited-Quantity Radioactive Samples

7.1 Containers

The inner packaging containers that may be used for these shipments include:

- Any size sample container

7.2 Description/Responsibilities

- The qualified shipper will determine that the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT.
- The qualified shipper will ship all samples that meet the Class 7 definition of radioactive materials and meet the activity requirements specified in Table 7 of 49 CFR 173.425, as Radioactive Materials in Limited Quantity. The qualified shipper will verify that all packages and their contents meet the requirements of 49 CFR 173.421, *Limited Quantities of Radioactive Materials*.
- The packaging used for shipping will meet the general requirements for packaging and packages specified in 49 CFR 173.24 and the general design requirements provided in 173.410. These standards state that a package must be capable of withstanding the effects of any acceleration, vibration, or vibration resonance that may arise under normal condition of transport without any deterioration in the effectiveness of the closing devices on the various

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receptacles or in the integrity of the package as a whole and without loosening or unintentionally releasing the nuts, bolts, or other securing devices even after repeated use.

- If the shipment is from a DOE facility, radiological screenings will be completed on all samples taken. The qualified shipper will review the results of each screening (alpha, beta, and gamma speciation). Samples will not be shipped offsite until the radiological screening has been performed.
- The total activity for each package will not exceed the relevant limits listed in Table 7 of 49 CFR 173.425. The A_2 value of the material will be calculated based on all radionuclides found during previous investigations (if any) in the area from which the samples are derived. The A_2 values to be used will be the most restrictive of all potential radionuclides as listed in 49 CFR 173.435.
- The radiation level at any point on the external surface of the package bearing the sample(s) will not exceed 0.005 mSv/hour (0.5 mrem/hour). These will be verified by dose and activity monitoring prior to shipment of the package.
- The removable radioactive surface contamination on the external surface of the package will not exceed the limits specified in 49 CFR 173.443(a). CDM will apply the DOE-established free release criteria for removable surface contamination of less than 20 dpm/100 cm² (alpha) and 1,000 dpm/100 cm² (beta/gamma). It should be noted that these values are more conservative than the DOT requirements for removable surface contamination.
- The qualified shipper will verify that the outside of the inner packaging is marked "Radioactive."
- The qualified shipper will verify that the excepted packages prepared for shipment under the provisions of 49 CFR 173.421 have a notice enclosed, or shown on the outside of the package, that reads, "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."

7.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3.

- Survey documentation/radiation screening results (if shipping from DOE or radiological sites)
- Orientation labels
- Excepted quantities label
- Consignor/consignee labels

7.4 Packaging of Limited-Quantity Radioactive Samples

The following steps are to be followed when packaging limited-quantity sample shipments.

- The cooler is to be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape prior to sampling.
- At a minimum the label must contain:
 - Project name
 - Project number

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- Date and time of sample collection
- Sample location
- Sample identification number
- Collector's initials
- This step is optional; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place sufficient amount of vermiculite, or approved packaging material, in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- If required, place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tying or taping.
- Place a label marked Radioactive on the outside of the sealed bag.
- Enclose a notice that includes the name of the consignor or consignee and the following statement: "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."
- Note that both DOT and IATA apply different limits to the quantity in the inside packing and in the outside packing.
- The maximum weight of the package shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- If a cooler is used, wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix package orientation labels on two opposite sides of the cooler/package.
- Affix a completed Excepted Quantities label to the side of the cooler/package.
- Secure any marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of the cooler labeling/marking is shown in Figure 2.

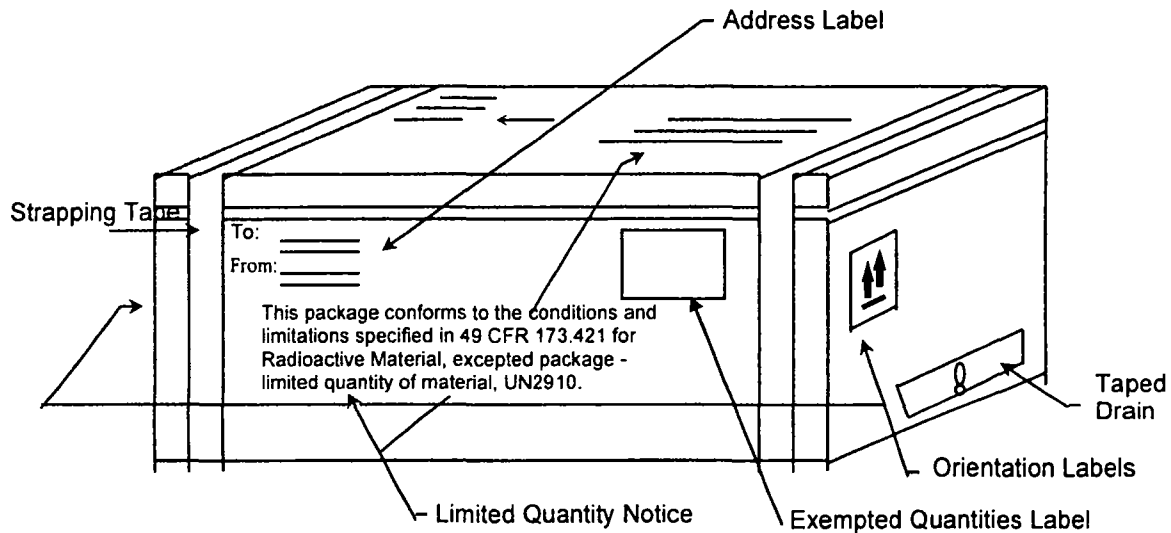
Note: No marking or labeling can be obscured by strapping or duct tape.

- Complete the Shipment Quality Assurance Checklist (Appendix B).

Note: Except as provided in 49 CFR 173.426, the package will not contain more than 15 grams of ²³⁵U.

Note: A declaration of dangerous goods is not required.

Figure 2 - Radioactive Material – Limited-Quantity Cooler Marking Example



8.0 References

U.S. Environmental Protection Agency, *Sampler's Guide to the Contract Laboratory Program*, EPA/540/P-90/006, December 1990.

U.S. Environmental Protection Agency, Region IV, *Standard Operating Procedures and Quality Assurance Manual*, February 1991.

U.S. Environmental Protection Agency Rule, 40 CFR 136.

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Appendix A
Dangerous Goods and Hazardous Materials Inspection Checklist
for Shipping Limited-Quantity

Sample Packaging

Yes	No	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The VOA vials are wrapped in bubble wrap and placed inside a zip-type bag.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The VOA vials are placed into a polyethylene bottle, filled with vermiculite, and tightly sealed.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The drain plug is taped inside and outside to ensure control of interior contents.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The samples have been placed inside garbage bags with sufficient bags of ice to preserve samples at 4°C.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The cooler weighs less than the 66-pound limit for limited-quantity shipment.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The garbage bag has been sealed with tape (or tied) to prevent movement during shipment.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The chain-of-custody has been secured to the interior of the cooler lid.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The cooler lid and sides have been taped to ensure a seal.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The custody seals have been placed on both the front and back hinges of the cooler, using waterproof tape.

Air Waybill Completion

Yes	No	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Section 1 has the shipper's name, company, and address; the account number, date, internal billing reference number; and the telephone number where the shipper can be reached.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Section 2 has the recipient's name and company along with a telephone number where they can be reached.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Section 3 has the Bill Sender box checked.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Section 4 has the Standard Overnight box checked.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Section 5 has the Deliver Weekday box checked.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Section 6 has the number of packages and their weights filled out. Was the total of all packages and their weights figured up and added at the bottom of Section 6?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Under the Transport Details box, the Cargo Aircraft Only box is obliterated, leaving only the Passenger and Cargo Aircraft box.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Under the Shipment Type, the Radioactive box is obliterated, leaving only the Non-Radioactive box.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Under the Nature and Quantity of Dangerous Goods box, the Proper Shipping Name, Class or Division, UN or ID No., Packing Group, Subsidiary Risk, Quantity and Type of Packing, Packing Instructions, and Authorization have been filled out for the type of chemical being sent.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Name, Place and Date, Signature, and Emergency Telephone Number appears at the bottom of the FedEx Airbill.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The statement "In accordance with IATA/ICAO" appears in the Additional Handling Information box.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Emergency Contact Information at the bottom of the FedEx Airbill is truly someone who can respond any time of the day or night.

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Proper Shipping Name	Class or Division	UN or ID No.	Packing Group	Sub Risk	Quantity	Packing Instruction	Authorization
Hydrochloric Acid Solution	8	UN1789	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Nitric Acid Solution (with less than 20%)	8	UN2031	II		1 plastic box × 0.5 L	Y807	Ltd. Qty.
Sodium Hydroxide Solution	8	UN1824	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Sulfuric Acid Solution	8	UN2796	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Methanol	3	UN1230	II		1 plastic box × 1 L	Y305	Ltd. Qty.

Sample Cooler Labeling

Yes No N/A

- ☐ ☐ ☐ The proper shipping name, UN number, and Ltd. Qty. appears on the shipping container.
- ☐ ☐ ☐ The corresponding hazard labels are affixed on the shipping container; the labels are not obscured by tape.
- ☐ ☐ ☐ The name and address of the shipper and receiver appear on the top and side of the shipping container.
- ☐ ☐ ☐ The air waybill is attached to the top of the shipping container.
- ☐ ☐ ☐ Up Arrows have been attached to opposite sides of the shipping container.
- ☐ ☐ ☐ Packaging tape does not obscure markings or labeling.

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**Appendix B
Shipment Quality Assurance Checklist**

Date: _____ Shipper: _____ Destination: _____

Item(s) Description: _____

Radionuclide(s): _____

Radiological Survey Results: surface _____ mrem/hr 1 meter _____

Instrument Used: Mfgr: _____ Model: _____

S/N: _____ Cal Date: _____

Limited-Quantity or Instrument and Article

- | Yes | No | |
|-----|-----|--|
| ___ | ___ | 1. Strong tight package (package that will not leak material during conditions normally incidental to transportation). |
| ___ | ___ | 2. Radiation levels at any point on the external surface of package less than or equal to 0.5 mrem/hr. |
| ___ | ___ | 3. Removable surface contamination less than 20 dpm/100 cm ² (alpha) and 1,000 dpm/100 cm ² (beta/gamma). |
| ___ | ___ | 4. Outside inner package bears the marking "Radioactive." |
| ___ | ___ | 5. Package contains less than 15 grams of ²³⁵ U (check yes if ²³⁵ U not present). |
| ___ | ___ | 6. Notice enclosed in or on the package that includes the consignor or consignee and the statement, "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910." |
| ___ | ___ | 7. Activity less than that specified in 49 CFR 173.425. Permissible package limit: Package Quantity: |
| ___ | ___ | 8. On all air shipments, the statement Radioactive Material, excepted package-limited quantity of material shall be noted on the air waybill. |

Qualified Shipper: _____ Signature: _____

Project Specific Modification

SOP No.: 2-2

SOP Title: Guide to Handling Investigation-Derived Waste

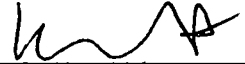
Project: Libby Asbestos Remedial Investigation (RI)


Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager:  Date: 5/7/03

Technical Reviewer:  Date: 5/7/03

QA Reviewer:  Date: 5/12/03

EPA Approval:  Date: 5/19/03

Reason for and duration of modification: Site-specific procedures for disposing of Libby amphibole asbestos contaminated IDW are different than CDM Technical SOP 2-2. These modifications are necessary for the entire duration of the project.

All IDW will be handled in accordance with CDM Technical SOP 2-2, Guide to Handling Investigation-Derived Waste, with the following modifications:

Section 5.2, Off Site Disposal - All IDW (not including excess soil volume) will be collected in transparent garbage bags and marked "IDW" with an indelible marker. These bags will be deposited into the asbestos contaminated waste stream for disposal at the mine.

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Prepared: Tim Eggert

Technical Review: Sharon Budney

QA Review: Jennifer Oxford

Approved: Michael C. Mally 2/24/04

Issued: [Signature] 2/18/04

Signature/Date

Signature/Date

1.0 Objective

This standard operating procedure (SOP) presents guidance for the management of investigation-derived waste (IDW). The primary objectives for managing IDW during field activities include:

- Leaving the site in no worse condition than existed prior to field activities
- Remove wastes that pose an immediate threat to human health or the environment
- Proper handling of onsite wastes that do not require offsite disposal or extended above-ground containerization
- Complying with federal, state, and facility applicable or relevant and appropriate requirements (ARARs)
- Careful planning and coordination of IDW management options
- Minimizing the quantity of IDW

2.0 Background

2.1 Definitions

Hazardous Waste - Discarded material that is regulated listed waste, or waste that exhibits ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261.3 or state regulations.

Investigation-Derived Wastes (IDWs) - Discarded materials resulting from field activities such as sampling, surveying, drilling, excavations, and decontamination processes that, in present form, possess no inherent value or additional usefulness without treatment. Wastes may be solid, liquid, or gaseous, or multiphase materials that may be classified as hazardous or non-hazardous.

Mixed-Waste - Any material that has been classified as hazardous and radioactive.

Radioactive Wastes - Discarded materials that are contaminated with radioactive constituents with specific activities in concentrations greater than the latest regulatory criteria (i.e., 10 CFR 20).

Treatment, Storage, and Disposal Facility (TSDF) - Permitted facilities that accept hazardous waste shipments for further treatment, storage, and/or disposal. These facilities must be permitted by the U.S. Environmental Protection Agency (EPA) and appropriate state agencies.

2.2 Discussion

Field investigation activities result in the generation of waste materials that may be characterized as hazardous or radioactive waste. IDWs may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials from collection of samples; residues from testing of treatment technologies and pump and treat systems; personal protective equipment (PPE); solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and

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equipment; and other wastes or supplies used in sampling and testing potentially hazardous or radiologically contaminated material.

Note: The client's representatives may not be aware of all potential contaminants. The management of IDW must comply with applicable regulatory requirements.

3.0 Responsibilities

Site Manager - The site manager is responsible for ensuring that all IDW procedures are conducted in accordance with this SOP. The site manager is also responsible for ensuring that handling of IDW is in accordance with site-specific requirements.

Project Manager - The project manager is responsible for identifying site-specific requirements for the disposal of IDW in accordance with federal, state, and/or facility requirements.

Field Crew Members - Field crew members are responsible for implementing this SOP and communicating any unusual or unplanned condition to the project manager's attention.

4.0 Required Equipment

Equipment required for IDW containment will vary according to site-specific/client requirements. Management decisions concerning the necessary equipment required should consider: containment method, sampling, labeling, maneuvering, and storage (if applicable). Equipment must be onsite and inspected before commencing work.

4.1 IDW Containment Devices

The appropriate containment device (drums, tanks, etc.) will depend on site- or client-specific requirements and the ultimate disposition of the IDW. Typical IDW containment devices can include:

- Plastic sheeting (polyethylene) with a minimum thickness of 20 millimeters
- Department of Transportation (DOT) approved steel containers
- Bulk storage tanks comprised of polyethylene or steel

Containment of IDW should be segregated by waste type (i.e., solid or liquid, corrosive or flammable, etc.) and source location. Volume of the appropriate containment device should be site-specific.

4.2 IDW Container Labeling

A "Waste Container" or "IDW Container" label or indelible marking should be applied to each container. Labeling or marking requirements for onsite IDW not expected to be transported offsite are:

- Labels and markings that contain the following information: project name, generation date, location of waste origin, container identification number, sample number (if applicable), and contents (drill cuttings, purge water, PPE, etc.).
- Each label or marking will be applied to the upper one-third of the container at least twice, on opposite sides.
- Containers that are 5 gallons or less may only require one label or set of markings.
- Labels or markings will be positioned on a smooth part of the container. The label must not be affixed across container bungs, seams, ridges, or dents.

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- Labels must be constructed of a weather-resistive material with markings made with a permanent marker or paint pen and capable of enduring the expected weather conditions. If markings are used, the color must be easily distinguishable from the drum color.
- Labels will be secured in a manner to ensure the label remains affixed to the container.

Labeling or marking requirements for IDW expected to be transported offsite must be in accordance with the requirements of 49 CFR 172.

4.3 IDW Container Movement

Staging areas for IDW containers should be predetermined and in accordance with site-specific and/or client requirements. Arrangements should be made prior to field mobilization as to the methods and personnel required to safely transport IDW containers to the staging area. Transportation offsite onto a public roadway is prohibited unless 49 CFR 172 requirements are met.

4.4 IDW Container Storage

Containerized IDW should be staged pending chemical analysis or further onsite treatment. Staging areas and bulk storage procedures are to be determined according to site-specific requirements. Containers are to be stored in such a fashion that the labels can be easily read. A secondary/spill container must be provided as appropriate.

5.0 Procedures

The three general options for managing IDW are (1) collection and onsite disposal, (2) collection for offsite disposal, and (3) collection and interim management. Attachment 1 summarizes media-specific information on generation processes and management options. The option selected should take into account the following factors:

- Type (soil, sludge, liquid, debris), quantity, and source of IDW
- Risk posed by managing the IDW onsite
- Compliance with regulatory requirements
- IDW minimization and consistency with the IDW remedy and the site remedy

In all cases the client should approve the plans for IDW. Formal plans for the management of IDW must be prepared as part of a work plan or separate document.

5.1 Onsite Disposal

5.1.1 Soil/Sludge/Sediment

The options for handling soil/sludge/sediment IDW are as follows:

1. Return to boring, pit, or source immediately after generation as long as returning the media to these areas will not increase site risks (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate "clean" areas).
2. Spread around boring, pit, or source within the area of contamination (AOC) as long as returning the media to these areas will not increase site risks (e.g., direct contact with surficial contamination).

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3. Consolidate in a pit within the AOC as long as returning the media to these areas will not increase site risks (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate "clean" areas).
4. Send to onsite TSDF - may require analytical analysis prior to treatment/disposal.

Note: These options may require client and/or regulatory approval.

5.1.2 Aqueous Liquids

The options for handling aqueous liquid IDW are as follows:

1. Discharge to surface water, only when IDW is not contaminated.
2. Discharge to ground surface close to the well, only if soil contaminants will not be mobilized in the process and the action will not contaminate clean areas. If IDW from the sampling of background upgradient wells is not a community concern or associated with soil contamination, this presumably uncontaminated IDW may be released on the ground around the well.
3. Discharge to sanitary sewer.
4. Send to onsite TSDF - may require analysis prior to treatment/disposal.

Note: These options may require analytical results to obtain client and/or regulatory approval.

5.1.3 Disposable PPE

The options for handling disposable PPE are as follows:

1. Double-bag contents in non-transparent trash bags and place in onsite industrial dumpster, only if PPE is not contaminated.
2. Containerize, label, and send to onsite TSDF - may require analysis prior to treatment/disposal.

5.2 Offsite Disposal

Before sending to an offsite TSDF, analysis may be required. Also, manifests are required.

Arrangements must be made with the client responsible for the site; it is CDM's policy not to sign manifests. The TSDF and transporter must be permitted for the respective wastes.

5.2.1 Soil/Sludge/Sediment

When the final site remedy requires offsite treatment and disposal, the IDW may be stored (e.g., drummed, covered in a waste pile) or returned to its source until final disposal. The management option selected should take into account the potential for increased risks, applicable regulations, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

5.2.2 Aqueous Liquids

When the final site remedy requires offsite treatment and disposal, the IDW may be stored (e.g., mobile tanks or drums) until final disposal. The management option selected should take into account the

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potential for increased risks, applicable regulations, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

5.2.3 Disposable PPE

When the final site remedy requires offsite treatment disposal, the IDW may be containerized and stored. The management option selected should take into account potential for increased risks, applicable regulations, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

5.3 Interim Measures

All interim measures must be approved by the client and regulatory agencies.

1. Storing IDW onsite until the final action may be practical in the following situations:
 - A. Returning wastes (especially sludges and soils) to their onsite source area would require re-excavation for disposal in the final remediation alternative.
 - B. Interim storage in containers may be necessary to provide adequate protection to human health and the environment.
 - C. Offsite disposal options may trigger land disposal regulations under the Resource Conservation and Recovery Act (RCRA). Storing IDW until the final disposal of all wastes from the site will eliminate the need to address this issue more than once.
 - D. Interim storage may be necessary to provide time for sampling and analysis.
2. Segregate and containerize all waste for future treatment and/or disposal.
 - A. Containment options for soil/sludge/sediment may include drums or covered waste piles in AOC.
 - B. Containment options for aqueous liquids may include mobile tanks or drums.
 - C. Containment options for PPE may include drums or roll-off boxes.

6.0 Restrictions/Limitations

Site Managers Should Determine the Most Appropriate Disposal Option for Aqueous Liquids on a Site-Specific Basis. Parameters to consider, especially when determining the level of protection, include the volume of IDW, the contaminants present in the groundwater, the presence of contaminants in the soil at the site, whether the groundwater or surface water is a drinking water supply, and whether the groundwater plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant solid components.

Disposable sampling materials, disposable PPE, decontamination fluids, etc. will always be managed on a site-specific basis. **Under No Circumstances Should These Types of Materials Be Brought Back to the Office or Warehouse.**

Guide To Handling Investigation-Derived Waste

SOP: 2-2
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7.0 References

Environmental Resource Center. 1992. *Hazardous Waste Management Compliance Handbook*, Van Nostrand Reinhold.

Institute of Hazardous Materials Management. 1992. *Handbook on Hazardous Materials Management*, 4th Ed.

U. S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.1.

U. S. Environmental Protection Agency. August 1990. *Low-Level Mixed Waste: A RCRA Perspective for NRC Licensees*, EPA/530-SW-90-057.

U. S. Environmental Protection Agency. May 1991. *Management of Investigation-Derived Wastes During Site Inspections*, EPA/540/G-91/009.

U. S. Environmental Protection Agency. January 1992. *Guide to Management of Investigation-Derived Wastes*, 9345.3-03FS.

U. S. Environmental Protection Agency, Region IV. May 1996 and 1997. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, revisions.

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Attachment 1 IDW Management Options

Type of IDW	Generation Processes	Management Options
Soil	<ul style="list-style-type: none"> Well/Test pit installations Borehole drilling Soil sampling 	<p>Onsite Disposal</p> <ul style="list-style-type: none"> Return to boring, pit, or source immediately after generation Spread around boring, pit, or source within the AOC Consolidate in a pit (within the AOC) Send to onsite TSDF <p>Offsite Disposal</p> <ul style="list-style-type: none"> Client to send to offsite TSDF <p>Interim Management</p> <ul style="list-style-type: none"> Store for future treatment and/or disposal
Sludge/Sediment	<ul style="list-style-type: none"> Sludge pit/sediment sampling 	<p>Onsite Disposal</p> <ul style="list-style-type: none"> Return to boring, pit, or source immediately after generation Send to onsite TSDF <p>Offsite Disposal</p> <ul style="list-style-type: none"> Client to send to offsite TSDF <p>Interim Management</p> <ul style="list-style-type: none"> Store for future treatment and/or disposal
Aqueous Liquids (groundwater, surface water, drilling fluids, wastewaters)	<ul style="list-style-type: none"> Well installation/development Well purging during sampling Groundwater discharge during pump tests Surface water sampling Wastewater sampling 	<p>Onsite Disposal</p> <ul style="list-style-type: none"> Pour onto ground close to well (nonhazardous waste) Discharge to sewer Send to onsite TSDF <p>Offsite Disposal</p> <ul style="list-style-type: none"> Client to send to offsite commercial treatment unit Client to send to publicly owned treatment works (POTW) <p>Interim Management</p> <ul style="list-style-type: none"> Store for future treatment and/or disposal
Decontamination Fluids	<ul style="list-style-type: none"> Decontamination of PPE and equipment 	<p>Onsite Disposal</p> <ul style="list-style-type: none"> Send to onsite TSDF Evaporate (for small amounts of low contamination organic fluids) Discharge to ground surface <p>Offsite Disposal</p> <ul style="list-style-type: none"> Client to send to offsite TSDF Discharge to sewer <p>Interim Management</p> <ul style="list-style-type: none"> Store for future treatment and/or disposal
Disposable PPE and Sampling Equipment	<ul style="list-style-type: none"> Sampling procedures or other onsite activities 	<p>Onsite Disposal</p> <ul style="list-style-type: none"> Place in onsite industrial dumpster Send to onsite TSDF <p>Offsite Disposal</p> <ul style="list-style-type: none"> Client to send to offsite TSDF <p>Interim Management</p> <ul style="list-style-type: none"> Store for future treatment and/or disposal

Adapted from U.S. Environmental Protection Agency, Guide to Management of Investigation-Derived Wastes, 9345-03FS, January 1992.

Project-Specific Modification

SOP No.: 4-1

SOP Title: Field Logbook Content and Control

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: [Signature] Date: 5/7/03

Technical Reviewer: [Signature] Date: 5/11/03

QA Reviewer: [Signature] Date: 5/12/03

EPA Approval: [Signature] Date: 5/19/03

Reason for and duration of modification: Site-specific procedures field logbook completions are different than CDM Technical SOP 4-1. These modifications are necessary for the entire duration of the project.

All content and control of will logbooks will be done accordance with CDM Technical SOP 4-1, Field Logbook Content and Control, with the following modifications:

Section 5.2, Operation – A new page will be completed for each property where information is collected for RI activities. The header information will include the address, the name of the property owner, and the building identification number of structures on the property.

When following the line-out and signature procedures to close a logbook page, the author must also print their name under the signature.

Field Logbook Content and Control

SOP 4-1

Revision: 5

Date: March 1, 2004

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Prepared: Del Baird

Technical Review: Sharon Budney

QA Review: Douglas J. Urdike

Approved: Michael C. Mally 2/24/04

Signature/Date

Issued: [Signature] 2/18/04

Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to set CDM Federal (CDM) criteria for content entry and form of field logbooks. Field logbooks are an essential tool to document field activities for historical and legal purposes.

2.0 Background

2.1 Definitions

Biota - The flora and fauna of a region.

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians.

2.2 Discussion

Information recorded in field logbooks includes field team names, observations, data, calculations, date/time, weather, and description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain deviations from plans and descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

3.0 Responsibilities

Field Team Leader (FTL) - The FTL is responsible for ensuring that the format and content of data entries are in accordance with this procedure.

Site Personnel - All CDM employees who make entries in field logbooks during onsite activities are required to read this procedure prior to engaging in this activity. The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance. Site personnel will return field logbooks to the records file at the end of the assignment.

4.0 Required Equipment

- Site-specific plans
- Field notebook
- Indelible black or blue ink pen
- Ruler or similar scale

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5.0 Procedures

5.1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks must be familiar with all procedures applicable to the field activity being performed. These procedures should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation. These procedures should be located at the field office.

Field logbooks shall be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the logbook. Prior to use in the field, each logbook will be marked with a specific document control number issued by the document control administrator, if required by the contract quality implementation plan (QIP). Not all contracts require document control numbers. The following information shall be recorded on the cover of the logbook:

- Field logbook document control number.
- Activity (if the logbook is to be activity-specific) and location.
- Name of CDM contact and phone number(s).
- Start date.
- In specific cases, special logbooks may be required (e.g., waterproof paper for stormwater monitoring).

The first few (approximately five) pages of the logbook will be reserved for a table of contents (TOC). Mark the first page with the heading and enter the following:

Table of Contents

Date/Description	Page
(Start Date)/Reserved for TOC	1-5

The remaining pages of the table of contents will be designated as such with "TOC" written on the top center of each page.

5.2 Operation

Requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the logbook. If data collection forms are specified by an activity-specific plan, this information need not be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Do not erase or blot out any entry at any time. Indicate any deletion by a single line through the material to be deleted. Initial and date each deletion. Take care to not obliterate what was written previously.
- Do not remove any pages from the book.

Field Logbook Content and Control

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Specific requirements for field logbook entries include:

- Initial and date each page.
- Sign and date the final page of entries for each day.
- Initial and date all changes.
- Multiple authors must sign out the logbook by inserting the following:
Above notes authored by:
 - (Sign name)
 - (Print name)
 - (Date)
- A new author must sign and print his/her name before additional entries are made.
- Draw a diagonal line through the remainder of the final page at the end of the day.
- Record the following information on a daily basis:
 - Date and time
 - Name of individual making entry
 - Names of field team and other persons onsite
 - Description of activity being conducted including station or location (i.e., well, boring, sampling location number) if appropriate
 - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
 - Level of personal protection to be used
 - Serial numbers of instruments
 - Required calibration information
 - Serial/tracking numbers on documentation (e.g., carrier air bills)

Entries into the field logbook shall be preceded with the time (written in military units) of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In these cases, the logbook must reference the automatic data record or form.

At each station where a sample is collected or an observation or measurement made, a detailed description of the location of the station is required. Use a compass (include a reference to magnetic declination corrections), scale, or nearby survey markers, as appropriate. A sketch of station location may be warranted. All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is toward the top of the page. Maps, sketches, figures, or data that will not fit on a logbook page should be referenced and attached to the logbook to prevent separation.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities.
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.
- Problems, downtime, or delays.
- Upgrade or downgrade of personal protection equipment.

Field Logbook Content and Control

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5.3 Post-Operation

To guard against loss of data due to damage or disappearance of logbooks, completed pages shall be periodically photocopied (weekly, at a minimum) and forwarded to the field or project office. Other field records shall be photocopied and submitted regularly and as promptly as possible to the office. When possible, electronic media such as disks and tapes should be copied and forwarded to the project office.

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook shall be submitted to the records file.

6.0 Restrictions/Limitations

Field logbooks constitute the official record of onsite technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM personnel and their subcontractors. They are documents that may be used in court to indicate dates, personnel, procedures, and techniques employed during site activities. Entries made in these logbooks should be factual, clear, precise, and non-subjective. Field logbooks, and entries within, are not to be used for personal use.

7.0 References

Sandia National Laboratories, *Procedure for Preparing Sampling and Analysis Plan, Site-Specific Sampling Plan, and Field Operating Procedures*, QA-02-03, Albuquerque Environmental Program Department 3220, Albuquerque, New Mexico, 1991.

Sandia National Laboratories, Division 7723, *Field Operation Procedure for Field Logbook Content and Control*, Environmental Restoration Department, Albuquerque, New Mexico, 1992.

Project-Specific Modification

SOP No.: 4-2

SOP Title: Photographic Documentation of Field Activities

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: [Signature] Date: 5/7/03

Technical Reviewer: [Signature] Date: 5/7/03

QA Reviewer: [Signature] Date: 5/12/03

EPA Approval: [Signature] Date: 5/19/03

Reason for and duration of modification: Site-specific procedures for photographs taken by digital cameras are different than the current SOP.

All photographs will be recorded in accordance with CDM Technical SOP 4-2, Photographic Documentation of Field Activities, with the following modifications:

Section 5.2.2, General Guidelines for Still Photography - A slate is not required for each new roll of film. The information for the slate will be recorded in the field logbook. The numbers assigned by the digital camera will be used instead of the photographer assigning the number. The caption information will either be on the back of the photograph or the photograph will be numbered or labeled and the caption information listed next to the number or label in the photograph log. On the digital photos, a caption will be included in the picture stating property address/location, date, and name of feature. All team members, as stated in the logbook, will be photographers and witnesses at the property. Slates are not required for close-up photographs. Instead the required information can be listed in the logbook or photograph log. A color strip is not required for close-up or feature photographs.

Section 5.2.4, Photographic Documentation - The name of the laboratory, time and date of drop-off, and receipt of film is not required to be recorded for this project.

Project-Specific Modification

Section 5.3.2, Archive Procedures - Digital photographs will be archived on compact discs. These discs will be assigned a document control number written on the disc case as well as well as the disc.

Photographic Documentation of Field Activities

SOP 4-2

Revision: 6

Date: March 1, 2004

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Prepared: David O. Johnson

Technical Review: Jo Nell Mullins

QA Review: Laura Splichal

Approved: Michael C. Mally 2/24/04

Issued: [Signature] 2/10/04
Signature/Date

Signature/Date

1.0 Objective

The purpose of this standard operating procedure (SOP) is to provide standard guidelines and methods for photographic documentation, which include still and digital photography and videotape recordings of field activities and site features (geologic formations, core sections, lithologic samples, water samples, general site layout, etc.). This document shall provide guidelines designed for use by a professional or amateur photographer. This SOP is intended for circumstances when formal photographic documentation is required. Based on project requirements, it may not be applicable for all photographic activities.

2.0 Background

2.1 Definitions

Photographer - A photographer is the camera operator (professional or amateur) of still photography, including digital photography, or videotape recording whose primary function with regard to this SOP is to produce documentary or data-oriented visual media.

Identifier Component - Identifier components are visual components used within a photograph such as visual slates, reference markers, and pointers.

Standard Reference Marker - A standard reference marker is a reference marker that is used to indicate a feature size in the photograph and is a standard length of measure, such as a ruler, meter stick, etc. In limited instances, if a ruled marker is not available or its use is not feasible, it can be a common object of known size placed within the visual field and used for scale.

Slates - Slates are blank white index cards or paper used to present information pertaining to the subject/procedure being photographed. Letters and numbers on the slate will be bold and written with black, indelible marking pens.

Arrows and Pointers - Arrows and pointers are markers/pointers used to indicate and/or draw attention to a special feature within the photograph.

Contrasting Backgrounds - Contrasting backgrounds are backdrops used to lay soil samples, cores, or other objects on for clearer viewing and to delineate features.

Data Recording Camera Back - A data recording camera back is a camera attachment or built-in feature that will record, at the very least, frame numbers and dates directly on the film.

2.2 Discussion

Photographs and videotape recordings made during field investigations are used as an aid in documenting and describing site features, sample collection activities, equipment used, and possible

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lithologic interpretation. This SOP is designed to illustrate the format and desired placement of identifier components, such as visual slates, standard reference markers, and pointers. These items shall become an integral part of the "visual media" that, for the purpose of this document, shall encompass still photographs, digital photographs, and videotape recordings (or video footage). The use of a photographic logbook and standardized entry procedures are also outlined. These procedures and guidelines will minimize potential ambiguities that may arise when viewing the visual media and ensure the representative nature of the photographic documentation.

2.3 Associated Procedures

- CDM Federal SOP 4-1, Field Logbook Content and Control

3.0 Responsibilities

Field Team Leader (FTL) – The FTL is responsible for ensuring that the format and content of photographic documentation are in accordance with this procedure. The FTL is responsible for directing the photographer to specific situations, site features, or operations that the photographer will be responsible for documenting.

Photographer – The photographer shall seek direction from the FTL and regularly discuss the visual documentation requirements and schedule. The photographer is responsible for maintaining a logbook per Sections 5.1, 5.2.4, and 5.3.1 of this SOP.

4.0 Required Equipment

The following is a general list of equipment that may be used:

- 35mm camera or disposable single use camera (35mm or panoramic use)
- Digital camera
- Extra batteries for 35mm camera
- Video camera
- Logbook
- Indelible black or blue ink pen
- Standard reference markers
- Slates
- Arrows or pointers
- Contrasting backgrounds
- Medium speed, or multi purpose fine-grain, color, 35 mm negative film or slide film (project dependent)
- Data recording camera back (if available)
- Storage medium for digital camera

5.0 Procedures

5.1 Documentation

A commercially available, bound logbook will be used to log and document photographic activities. Review the CDM Federal SOP 4-1, Field Logbook Content and Control and prepare all supplies needed for logbook entries.

Note: A separate photographic logbook is not required. A portion of the field logbook may be designated as the photographic log and documentation section.

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5.1.1 Field - Health and Safety Considerations

There are no hazards that an individual will be exposed to specific to photographic documentation. However, site-specific hazards may arise depending on location or operation. Personal protective equipment used in this operation will be site-specific and dictated through requirements set by the site safety officer, site health and safety plan, and/or prescribed by the CDM Federal Corporate Health and Safety Program. The photographer should contact the site safety officer for health and safety orientation prior to commencing field activities. The site health and safety plan must be read prior to entry to the site, and all individuals must sign the appropriate acknowledgement that this has been done.

The photographer should be aware of any potential physical hazards while photographing the subject (e.g., traffic, low overhead hazard, edge of excavation).

5.2 Operation

5.2.1 General Photographic Activities in the Field

The following sections provide general guidelines that should be followed to visually document field activities and site features using still/digital cameras and video equipment. Listed below are general suggestions that the photographer should consider when performing activities under this SOP:

- The photographer should be prepared to make a variety of shots, from close-up to wide-angle. Many shots will be repetitive in nature or format especially close-up site feature photographs. Consideration should therefore be given to designing a system or technique that will provide a reliable repetition of performance.
- All still film photographs should be made using a medium speed, or multi purpose fine-grain, color negative film in the 35 mm format unless otherwise directed by the FTL.
- It is suggested that Kodak brand "Ektapress Gold Deluxe" film or equivalent be used as the standard film for the still photography requirements of the field activities. This film is stable at room temperature after exposure and will better survive the time lag between exposure and processing. It is suggested that film speed ASA 100 should be used for outdoor photographs in bright sunlight, ASA 200 film should be used in cloudy conditions, and ASA 400 film should be used indoors or for very low-light outdoor photographs.
- No preference of videotape brand or digital storage medium is specified and is left to the discretion of the photographer.
- The lighting for sample and feature photography should be oriented toward a flat condition with little or no shadow. If the ambient lighting conditions are inadequate, the photographer should be prepared to augment the light (perhaps with reflectors or electronic flash) to maintain the desired visual effect.
- Digital cameras have multiple photographic quality settings. A camera that obtains a higher resolution (quality) has a higher number of pixels and will store a fewer number of photographs per digital storage medium.

5.2.2 General Guidelines for Still Photography

Slate Information

When directed by the FTL, each new roll of film or digital storage medium shall contain on the first usable frame (for film) a slate with consecutively assigned control numbers (a consecutive, unique number that is assigned by the photographer as in sample numbers).

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Caption Information

All still photographs will have a full caption permanently attached to the back or permanently attached to a photo log sheet. The caption should contain the following information (digital photographs should have a caption added after the photographs are downloaded):

- Film roll control number (if required) and photograph sequence number
- Date and time
- Description of activity/item shown (e.g., name of facility/site, specific project name, project no.)
- Direction (if applicable)
- Photographer

When directed by the FTL, a standard reference marker should be used in all documentary visual media. While the standard reference marker will be predominantly used in close-up feature documentation, inclusion in all scenes should be considered.

Digital media should be downloaded at least once each day.

Close-Up and Feature Photography

When directed by the FTL, close-up photographs should include a standard reference marker of appropriate size as an indication of the feature size and contain a slate marked with the site name and any identifying label, such as a well number or core depth, that clearly communicates to the viewer the specific feature being photographed.

Feature samples, core pieces, and other lithologic media should be photographed as soon as possible after they have been removed from their in situ locations. This enables a more accurate record of their initial condition and color. When directed by the FTL, include a standard reference color strip (color chart such as Munsell Soil Color Chart or that available from Eastman Kodak Co.) within the scene. This is to be included for the benefit of the viewer of the photographic document and serves as a reference aid to the viewer for formal lithologic observations and interpretations.

Site Photography

Site photography, in general, will consist predominantly of medium and wide-angle shots. A standard reference marker should be placed adjacent to the feature or, when this is not possible, within the same focal plane.

While it is encouraged that a standard reference marker and caption/slate be included in the scene, it is understood that situations will arise that preclude their inclusion within the scene. This will be especially true of wide-angle shots. In such a case, the film/tape control number shall be entered in the photographic logbook along with the frame number and all other information pertinent to the scene.

Panoramic

In situations where a wide-angle lens does not provide sufficient subject detail, a single-use disposable panoramic camera is recommended. If this type of camera is not available, a panoramic series of two or three photos would be appropriate. Panoramas can provide greater detail while covering a wide subject, such as an overall shot of a site.

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To shoot a panoramic series using a standard 35 mm or digital camera, the following procedure is recommended.

- Use a stable surface or tripod to support the camera
- Allow a 20 to 30 percent overlap while maintaining a uniform horizon
- Complete two to three photos per series

5.2.3 General Photographic Documentation Using Video Cameras

As a reminder, it is not within the scope of this document to set appropriate guidelines for presentation or "show" videotape recording. The following guidelines are set for documentary videotape recordings only and should be implemented at the discretion of the FTL.

Documentary videotape recordings of field activities may include an audio slate for all scenes. At the beginning of each video session, an announcer will recite the following information: date, time (in military units), photographer, site ID number, and site location. This oral account may include any additional information clarifying the subject matter being recorded.

A standard reference marker may be used when taking close-up shots of site features with a video camera. The scene may also include a caption/slate. It should be placed adjacent and parallel to the feature being photographed.

It is recommended that a standard reference marker and caption/slate be included in all scenes. The caption information is vital to the value of the documentary visual media and should be included. If it is not included within the scene, it should be placed before the scene.

Original videotape recordings will not be edited. This will maintain the integrity of the information contained on the videotape. If editing is desired, a working copy of the original videotape recording can be made.

A label should be placed on the videotape with the appropriate identifying information (i.e., project name, project number, date, location, etc.).

5.2.4 Photographic Documentation

Photographic activities must be documented in a photographic logbook or in a section of the field logbook. The photographer will be responsible for making proper entries.

In addition to following the technical standards for logbook entry as referenced in CDM Federal SOP 4-1, the following information should be maintained in the appropriate logbook:

- Photographer name.
- If required, an entry shall be made for each new roll/tape control number assigned.
- Sequential tracking number for each photograph taken (for digital cameras, the camera-generated number may be used).
- Date and time (military time).
- Location.
- A description of the activity/item photographed.

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- If needed, a description of the general setup, including approximate distance between the camera and the subject, may be recorded in the logbook.
- Record as much other information as possible to assist in the identification of the photographic document.

5.3 Post Operation

All film will be sent for development and printing to a photographic laboratory (to be determined by the photographer). The photographer will be responsible for arranging transport of the film from the field to the photographic laboratory. The photographer shall also be responsible for arranging delivery of the negatives and photographs, digital storage medium, or videotape to the project management representative.

5.3.1 Documentation

At the end of each day's photographic session, the photographer(s) will ensure that the appropriate logbook has been completely filled out and maintained as outlined in CDM Federal SOP 4-1.

5.3.2 Archive Procedures

1. Photographs and the associated set of uncut negatives, digital media, and original unedited documentary videotape recordings will be submitted to the project files and handled according to contract records requirements. The FTL will ensure their proper distribution.
2. Completed pages of the appropriate logbook will be copied weekly and submitted to the project files.

6.0 Restrictions/Limitations

This document is designed to provide a set of guidelines for the field amateur or professional photographer to ensure that an effective and standardized program of visual documentation is maintained.

It is not within the scope of this document to provide instruction in photographic procedures, nor is it within the scope of this document to set guidelines for presentation or "show" photography.

The procedures outlined herein are general by nature. The FTL is responsible for specific operational activity or procedure. Questions concerning specific procedures or requirements should be directed to the FTL.

Note: Some sites do not permit photographic documentation. Check with the site contact for any restrictions.

7.0 References

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3, February 2001, Appendix F.

U.S. Environmental Protection Agency, Region IV, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, Athens, Georgia, November 2001.

U.S. Environmental Protection Agency, National Enforcement Investigations Center, *Multi-Media Investigation Manual*, EPA-330/9-89-003-R, Revised March 1992, p. 85.

Project-Specific Modification

SOP No.: 4-5

SOP Title: Field Equipment Decontamination at Nonradioactive Sites

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager:  Date: 5/7/03

Technical Reviewer:  Date: 5/7/03

QA Reviewer:  Date: 5/12/03

EPA Approval:  Date: 5/19/03

Reason for and duration of modification: Site-specific procedures for decontamination of Libby amphibole asbestos contaminated field equipment are different than CDM Technical SOP 4-5. These modifications are necessary for the entire duration of the project.

All equipment used to collect, handle, or measure soil samples will be decontaminated in accordance with CDM Technical SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites, with the following modifications:

Section 4.0, Required Equipment - Plastic sheeting will not be used during decontamination procedures. American Society for Testing and Materials (ASTM) Type II water will not be used. Rather, locally available deionized (DI) water will be used.

Section 5.0, Procedures - Decontamination water will not be captured and will be discharged to the ground at the property.

Section 5.6, Waste Disposal - Decontamination water will not be captured and will not be packaged, labeled, or stored as investigation-derived waste (IDW).

Prepared: Steven Fundingsland

Technical Review: Tim Turner

QA Review: Doug Updike

Approved: *Michael C. Malloy* 12/21/04

Issued:

[Signature] 12/29/04
Signature/Date

[Signature]
Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to describe the general procedures required for decontamination of field equipment at nonradioactive sites. This SOP serves as a guide and is applicable at most sites; however, it should be noted that site-specific conditions (i.e., type of contamination, type of media sampled) and the governing agency (i.e., EPA, DOE, USACE) may require modifications to the decontamination procedures provided in this SOP.

2.0 Background

2.1 Definitions

Acid Rinse - A solution of 10 percent nitric or hydrochloric acid made from reagent grade acid and analyte-free water.

Analyte-Free Water - Tap water that has been treated so that the water contains no detectable heavy metals or other inorganic compounds. Analyte-free water should be stored only in clean glass, stainless steel, or plastic containers that can be closed when not in use.

Clean - Free of visible contamination and when decontamination has been completed in accordance with this SOP.

Cross Contamination - The transfer of contaminants through equipment or personnel from the contamination source to less contaminated or noncontaminated samples or areas.

Decontamination - The process of rinsing or otherwise cleaning the surfaces of equipment to rid them of contaminants and to minimize the potential for cross contamination of samples or exposure of personnel.

Organic-Free/Analyte-Free Water - Tap water that has been treated so that the water meets the analyte-free water criteria and contains no detectable organic compounds. Organic-free/analyte-free water should be stored only in clean glass, Teflon™, or stainless steel containers that can be closed when not in use.

Potable Water - Tap water may be obtained from any municipal system. Chemical analysis of the water source may be required before it is used.

Soap - Low-sudsing, nonphosphate detergent such as Liquinox™.

Solvent Rinse - Pesticide grade, or better, isopropanol, acetone, or methanol.

2.2 Discussion

Decontamination of field equipment is necessary to ensure acceptable quality of samples by preventing cross contamination. Further, decontamination reduces health hazards and prevents the spread of contaminants offsite.

3.0 Responsibilities

Field Team Leader - The field team leader (FTL) ensures that field personnel are trained in the performance of this procedure and that decontamination is conducted in accordance with this procedure. The FTL may also be required to collect and document rinsate samples to provide quantitative verification that these procedures have been correctly implemented.

4.0 Required Equipment

- Stiff-bristle scrub brushes
- Plastic buckets and troughs
- Soap
- Nalgene or Teflon sprayers or wash bottles or 2- to 5-gallon, manual-pump sprayer (pump sprayer material must be compatible with the solution used)
- Plastic sheeting
- Disposable wipes, rags, or paper towels
- Potable water*
- Analyte-free water
- Organic-free/analyte-free water
- Gloves, safety glasses, and other protective clothing as specified in the site-specific health and safety plan
- High-pressure pump with soap dispenser or steam-spray unit (for large equipment only)
- Appropriate decontamination solutions pesticide grade or better and traceable to a source (e.g., 10 percent and/or 1 percent nitric acid [HNO₃], acetone, methanol, isopropanol, hexane)
- Tools for equipment assembly and disassembly (as required)
- 55-gallon drums or tanks (as required)
- Pallets for drums or tanks holding decontamination water (as required)

* Potable water may be required to be tested for contaminants before use. Check field plan for requirements.

5.0 Procedures

All reusable equipment (nondedicated) used to collect, handle, or measure samples will be decontaminated before coming into contact with any sample. Decontamination of equipment will occur either at a central decontamination station or at portable decontamination stations set up at the sampling location, drill site, or monitoring well location. The centrally located decontamination station will include an appropriately sized bermed and lined area on which equipment decontamination will occur and shall be equipped with a collection system and storage vessels. In certain circumstances, berming is not required when small quantities of water are being generated and for some short duration field activities (i.e., pre-remedial sampling). Equipment should be transported to the decontamination station in a manner to prevent cross contamination of equipment and/or area. Precautions taken may include enclosing augers in plastic wrap while being transported on a flatbed truck.

The decontamination area will be constructed so that contaminated water is either collected directly into appropriate containers (5-gallon buckets or steel wash tubs) or within the berms of the decontamination area that then drains into a collection system. Water from the collection system will be transferred into 55-gallon drums or portable tanks for storage. Typically, decontamination water will be staged until sampling results or waste characterization results are obtained and evaluated and the proper disposition of the waste is determined. The exact procedure for decontamination waste disposal should be discussed in the field plan. Also, solvent and acid rinse fluids may need to be segregated from other investigation-derived wastes.

All items that will come into contact with potentially contaminated media will be decontaminated before use and between sampling and/or drilling locations. If decontaminated items are not immediately used, they will be covered either with clean plastic or aluminum foil depending on the size of the item. All decontamination procedures for the equipment being used are as follows:

General Guidelines

- Potable, analyte-free, and organic-free/analyte-free water should be free of all contaminants of concern. Following the field plan, analytical data from the water source may be required.

- Sampling equipment that has come into contact with oil and grease will be cleaned with methanol or other approved alternative to remove the oily material. This may be followed by a hexane rinse and then another methanol rinse. Regulatory or client requirements regarding solvent use will be stated in the field plan.
- All solvents and acids will be pesticide grade or better and traceable to a source. The corresponding lot numbers will be recorded in the appropriate logbook. Solvents and acids are potentially hazardous materials and must be handled, stored, and transported accordingly. Solvents should never be used in a closed building. See the site-specific health and safety plan and/or the chemical's Material Safety Data Sheet (MSDS) for specific information regarding the safe use of the chemical.
- Decontaminated equipment will be allowed to air dry before being used.
- Documentation for all cleaning will be recorded in the appropriate logbook.
- Gloves, boots, safety glasses, and any other personnel protective clothing and equipment will be used as specified in the site-specific health and safety plan.

5.1 Heavy Equipment Decontamination

Heavy equipment includes drilling rigs and backhoes. Follow these steps when decontaminating this equipment:

- Establish a bermed decontamination area that is large enough to fully contain the equipment to be cleaned. If available, an existing wash pad or appropriate paved and bermed area may be used; otherwise, use one or more layers of heavy plastic sheeting to cover the ground surface and berms. All decontamination pads should be upwind of the area under investigation.
- With the rig in place, spray areas (rear of rig or backhoe) exposed to contaminated soils using a hot water high-pressure sprayer. Be sure to spray down all surfaces, including the undercarriage.
- Use brushes, soap, and potable water to remove dirt whenever necessary.
- Remove equipment from the decontamination pad and allow it to air dry before returning it to the work site.
- Record the equipment type, date, time, and method of decontamination in the appropriate logbook.
- After decontamination activities are completed, collect all contaminated wastewater, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles. All receptacles containing contaminated items must be properly labeled for disposal as detailed in the field plan. Liquids and solids must be drummed separately.

5.2 Downhole Equipment Decontamination

Downhole equipment includes hollow-stem augers, drill pipes, rods, stems, etc. Follow these steps when decontaminating this equipment:

- Set up a centralized decontamination area, if possible. This area should be set up to collect contaminated rinse waters and to minimize the spread of airborne spray.
- Set up a "clean" area upwind of the decontamination area to receive cleaned equipment for air-drying. At a minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces on which decontaminated equipment is to be placed. All decontamination pads should be upwind of any areas under investigation.
- Place the object to be cleaned on aluminum foil or plastic-covered wooden sawhorses or other supports. The objects to be cleaned should be at least 2 feet above the ground to avoid splashback when decontaminating.

- Using soap and potable water in the hot water high-pressure sprayer (or steam unit), spray the contaminated equipment. Aim downward to avoid spraying outside the decontamination area. Be sure to spray inside corners and gaps especially well. Use a brush, if necessary, to dislodge dirt.
- If using soapy water, rinse the equipment using clean, potable water. If using hot water, the rinse step is not necessary if the hot water does not contain a detergent. If the hot water contains a detergent, this final clean water rinse is required.
- Using a suitable sprayer, rinse the equipment thoroughly with analyte-free water.
- Remove the equipment from the decontamination area and place in a clean area upwind to air dry.
- Record equipment type, date, time, and method of decontamination in the appropriate logbook.
- After decontamination activities are completed, collect all contaminated wastewaters, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles. All receptacles containing contaminated items must be properly labeled for disposal. Liquids and solids must be drummed separately.

5.3 Sampling Equipment Decontamination

Sampling equipment is defined as equipment that comes into direct contact with the sample media. Such equipment includes split spoon samplers, well casing and screens, and spatulas or bowls used to homogenize samples. Follow these steps when decontaminating this equipment:

- Set up a decontamination line on plastic sheeting. The decontamination line should progress from "dirty" to "clean." A clean area shall be established upwind of the decontamination wash/rinse activities to dry the equipment. At a minimum, clean plastic sheeting must be used to cover the ground, table, or other surfaces that the decontaminated equipment is placed for drying.
- Disassemble any items that may trap contaminants internally. Do not reassemble the items until decontamination and air drying are complete.
- Wash the items with potable water and soap using a stiff brush as necessary to remove particulate matter and surface films. The items may be steam cleaned using soap and hot water as an alternative to brushing. Note that polyvinyl chloride or plastic items should not be steam cleaned. Items that have come into contact with concentrated and/or oily contaminants may need to be rinsed with a solvent such as hexane and allowed to air dry prior to this washing step.
- Thoroughly rinse the items with potable water.
- If sampling for metals, thoroughly rinse the items with an acid solution (e.g., 10 percent nitric acid) followed by a rinse using analyte-free water. If sampling for organic compounds, thoroughly rinse the items with solvent (e.g., isopropanol) followed by a rinse using analyte-free water. The specific chemicals used for the acid rinse and solvent rinse phases should be specified in the work plan. The acid rinsate and solvent rinsate must each be containerized separately. Acids and solvents are potentially hazardous materials and care must be exercised when using these chemicals to prevent adverse health affects (e.g., skin burns, irritation to the eyes and respiratory system, etc.). Appropriate personal protective equipment must be worn when using these chemicals. These chemicals (including spent rinsate) must be managed and stored appropriately. Special measures such as proper labels, paperwork, notification, etc. may be required when transporting or shipping these chemicals.
- Rinse the items thoroughly using organic-free/analyte-free water.
- Allow the items to air dry completely.

- After drying, reassemble the parts as necessary and wrap the items in clean plastic wrap or in aluminum foil.
- Record equipment type, date, time, and method of decontamination in the appropriate logbook.
- After decontamination activities are completed, collect all contaminated waters, used solvents and acids, plastic sheeting, and disposable personal protective equipment. Place the contaminated items in properly labeled drums for disposal. Liquids and solids must be drummed separately. Refer to site-specific plans for labeling and waste management requirements.

5.4 Pump Decontamination

Follow the manufacturer's recommendation for specified pump decontamination procedures. At a minimum, follow these steps when decontaminating pumps:

- Set up the decontamination area and separate "clean" storage area using plastic sheeting to cover the ground, tables, and other surfaces. Set up four containers: the first container shall contain dilute (nonfoaming) soapy water, the second container shall contain potable water, the third container shall be empty to receive wastewater, and the fourth container shall contain analyte-free water.
- The pump should be set up in the same configuration as for sampling. Submerge the pump intake (or the pump, if submersible) and all downhole-wetted parts (tubing, piping, foot valve) in the soapy water of the first container. Place the discharge outlet in the wastewater container above the level of the wastewater. Pump soapy water through the pump assembly until it discharges to the waste container. Scrub the outside of the pump and other wetted parts with a metal brush.
- Move the pump assembly to the potable water container while leaving discharge outlet in the waste container. All downhole-wetted parts must be immersed in the potable water rinse. Pump potable water through the pump assembly until it runs clear.
- Move the pump intake to the analyte-free water container. Pump the water through the pump assembly. Pump the volume of water through the pump specified in the field plan. Usually, three pump-and-line-assembly volumes will be required.
- Decontaminate the discharge outlet by hand, following the steps outlined in Section 5.3.
- Remove the decontaminated pump assembly to the clean area and allow it to air dry upwind of the decontamination area. Intake and outlet orifices should be covered with aluminum foil to prevent the entry of airborne contaminants and particles.
- Record the equipment type, serial number, date, time, and method of decontamination in the appropriate logbook.

5.5 Instrument Probe Decontamination

Instrument probes used for field measurements such as pH meters, conductivity meters, etc. will be decontaminated between samples and after use with analyte-free, or better, water.

5.6 Waste Disposal

Refer to site-specific plans for waste disposal requirements. The following are guidelines for disposing of wastes:

- All wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as investigation-derived waste.
- Small quantities of decontamination solutions may be allowed to evaporate to dryness.

- If large quantities of used decontamination solutions will be generated, each type of waste should be contained in separate containers.
- Unless otherwise required, plastic sheeting and disposable protective clothing may be treated as solid, nonhazardous waste.
- Waste liquids should be sampled, analyzed for contaminants of concern in accordance with disposal regulations, and disposed of accordingly.

6.0 Restrictions/Limitations

Nitric acid and polar solvent rinses are necessary only when sampling for metals or organics respectively. These steps should not be used, unless required, because of the potential for acid burns and ignitability hazards.

If the field equipment is not thoroughly rinsed and allowed to completely air dry before use, volatile organic residue, which interferes with the analysis, may be detected in the samples. The occurrence of residual organic solvents is often dependent on the time of year sampling is conducted. In the summer, volatilization is rapid, and in the winter, volatilization is slow. Check with your EPA region, state, and client for approved decontamination solvents.

7.0 References

American Society for Testing and Materials. 2002. *Standard Practice for Decontamination of Field Equipment at Nonradioactive Waste Sites*, ASTM D5088-02. January 10.

Department of Energy. Hazardous Waste Remedial Actions Program. 1996. *Standard Operating Procedures for Site Characterization*, DOE/HWP-100/R1. September.

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U. S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.1.

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Site-Specific Sampling Guidance Libby Superfund Site

Guidance No.: CDM-LIBBY-05, Revision 2

Guidance Title: Soil Sample Collection at Residential and Commercial Properties

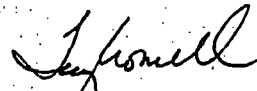
Approved by:



Technical Reviewer

5/10/07

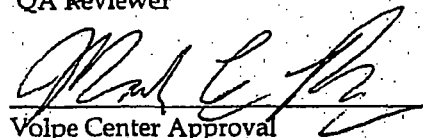
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QA Reviewer

5/10/07

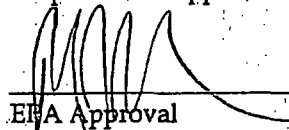
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Volpe Center Approval

05/10/07

Date



EPA Approval

5/10/07

Date

Section 1

Purpose

The goal of this standard operating procedure (SOP) is to provide a consistent method for the collection of 30-point composite surface soil sampling to support all investigations conducted at the Libby Superfund Site and specified in governing guidance documents. This SOP describes the equipment and operations used for sampling surface soils in residential and commercial areas, which will be submitted for the analysis of Libby amphibole asbestos. Refer to each investigation-specific guidance documents or work plan for detailed modifications to this SOP, where applicable. The EPA Team Leader or their designate must approve deviations from the procedures outlined in this document prior to initiation of the sampling activity.

Section 2

Responsibilities

Successful execution of this SOP requires a clear hierarchy of assigned roles with different sets of responsibilities associated with each role. All staff with responsibility for the collection of soil samples is responsible for understanding and implementing the requirements contained herein as well as any other governing guidance documents.

Task Leader (TL) or Field Team Leader (FTL) - The TL or FTL is responsible for overseeing sample collection processes as described in EPA approved governing guidance documents (i.e., site-specific sampling and analysis plans [SAPs], quality assurance project plans [QAPPs], etc.). The TL or FTL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and all governing guidance documents. The TL or FTL will communicate with the field team members regarding the specific collection objectives and anticipated situations that require deviation from this SOP. It is also the responsibility of the TL or FTL to communicate the need for any deviations from the SOP with the appropriate EPA personnel (team leader or their designate), and document the deviations using a Field Modification Form provided in each SAP or QAPP.

Field team members - Field team members performing the sampling described in this SOP are responsible for adhering to the applicable tasks outlined in this procedure while collecting samples at properties associated with the Libby Superfund Site. The field team members should have limited discretion with regard to collection procedures but should exercise judgment regarding the exact location of sample points, within the boundaries outlined by the TL or FTL.

Section 3

Equipment

- Measuring tape or wheel - Used to estimate the square footage of each land use area.
- Pin flags - Used to identify composite points within each sampling area.
- Trowel or push probe - For collecting surface soil samples.
- Shovel - For collecting surface soil samples.
- Stainless steel mixing bowl - Used to mix and homogenize composite soil samples after collection. Zip-top bags may also be used for homogenization if approved by the governing guidance documents.
- Gloves - For personal protection and to prevent cross-contamination of samples (disposable, powderless plastic or latex).
- Sample container - Gallon-sized zip-top plastic bags (2 per sample).
- Field clothing and personal protective equipment (PPE) - As specified in the current version of the site health and safety plan (HASp).
- Field sprayers - Used to suppress dust during sample collection and to decontaminate nondisposable sampling equipment between samples.
- Deionized (DI) water - Used in field sprayers to suppress dust and to clean and decontaminate sampling equipment.
- Plastic bristle brush - Used to clean and decontaminate sampling equipment.
- Wipes - Disposable, paper. Used to clean and decontaminate sampling equipment.
- Aluminum foil - Used to wrap decontaminated sampling equipment in between uses to prevent contamination during transport.
- Alconox - Used to clean and decontaminate sampling equipment weekly.
- 6-mil poly bag - Used to store and dispose of investigation-derived waste (IDW).
- Trash bag - Used to store and dispose of general trash.
- Field logbook/PDA - Used to record progress of sampling effort and record any problems and field observations.

- Visual Vermiculite Estimation Form (VVEF) - Used to record semi-quantitative estimates of visual vermiculite at each sub-sample location and point inspection (PI).
- Permanent marking pen - Used to label sample containers.
- Sample ID Labels (Index IDs)- Pre-printed stickers used to label sample containers.
- Cooler or other rigid container - Used to store samples while in the field.
- Custody Seals - For ensuring integrity of samples while in the field and during shipping.

Section 4

Sampling Approach

Upon arrival at each property, the field team will locate all parcels requiring sample collection depending on the investigation-specific objectives detailed in governing guidance documents. Parcels on a property will be sectioned into zones that share a similar land use. Zones established by land use areas may be subdivided based on site conditions (e.g., access, construction setup considerations, etc.). Use areas include:

- Specific Use Area (SUA): flowerbed, garden, flowerpot, stockpile, play area, dog pen, driveway (non-paved), parking lot (non-paved), road (non-paved), alley (non-paved)
- Common Use Area (CUA): yard, former garden, former flowerbed, walkway
- Limited Use Area (LUA): pasture, maintained/mowed field, overgrown areas with trails/footpaths, overgrown areas in between SUAs/CUAs
- Interior Surface Area (ISA): soil floor of garage, pumphouse, shed, crawlspace, earthen basement
- Non-Use Areas (NUA): wooded lot, un-maintained field. NUAs will be identified but will not be sampled at this time because they are not presently considered a complete exposure pathway. However, to the extent that NUAs may become a complete exposure pathway in the future, EPA may revisit NUAs at a later date.

After areas have been designated as zones (i.e., SUA zones, CUA zones, LUA zones, NUA zones, ISA zones), the field team will measure the zones with a measuring wheel and label the zone type and approximate square footage on the field sketch and/or design drawings. There is not a minimum or maximum square footage restriction on any zone.

In establishing zones at the property, no area type may be combined with any other area type. For example, driveways and flowerbeds are both SUAs but will be

separated into unique zones for soil sampling. Similarly, large CUAs such as yards may be subdivided into front yard, side yard, and back yard zones dependent on site conditions. Sectioning properties into additional zones will be at the discretion of the FTL but consistent among the teams. Conversely, not all land use areas previously mentioned will be applicable at every property.

It is anticipated that SUAs and ISA zones will generally tend to be smaller parcels. Combining small, proximal SUAs into one zone will be at the discretion of the FTL but consistent among teams. With the exception of proximal SUAs, all other land use areas will be contiguous when establishing zones at each property.

Composite sampling requires soil collection from multiple (sub-sample) points. Composite samples will be collected from similar land use areas (i.e., SUA, CUA, etc.) and will not be combined with any other use area. One composite sample will be collected from each zone that does not contain visual vermiculite.

For SUAs (e.g., driveway, garden, dog pen, etc.), composite samples will be collected from the 0- to 6-inch depth interval. If a depth of 6 in. cannot be attained given the varying levels of compaction in driveways, roads, etc. the maximum depth attainable will be documented in the field logbook/PDA. For non-SUAs (e.g., yard, former flowerbed, crawlspace, etc.), composite samples will be collected from 0 to 3 inches. All composite soil samples will have 30 sub-samples (i.e., 30-point composite sample) of approximately equal size for a final sample volume between 2,000 and 2,500 grams. Table 1 lists the sample depth for each type of land use area.

Table 1 Sampling Area and Depth		
Land Use Area	Label	Sampling Depth (Inches)
Special Use Area	SUA	0 – 6
Common Use Areas	CUA	0 – 3
Limited Use Area	LUA	0 – 3
Non-Use Area	NUA	Not Sampled
Interior Surface Zone	IS	0 – 3

As each sub-sample is collected, the soil will be inspected for visual vermiculite (VV) and the location and semi-quantitative estimates of VV will be recorded as prescribed in the SOP for Semi-Quantitative Visual Estimation of Vermiculite in Soil, Revision 1 (CDM 2007a).

Areas of SUAs with VV will not be sampled. Instead, the location will be recorded in the field logbook/PDA and on the field sketch or design drawing. If the SUA is of substantial size (greater than 1000 square feet [ft²]), and the VV is localized, additional PIs will be collected to determine the extent of VV and a sample will be collected from the remainder of the zone that does not contain VV. If the SUA measures less than 1,000 ft² and VV is present, a sample will not be collected from that SUA. Proximal

SUAs will not be combined into a SUA zone if VV is present. If visible vermiculite is not observed, proceed with sample collection of the SUA zone

Section 5

Sample Collection

Don the appropriate PPE as specified in the governing HASP. A new pair of disposable gloves is to be worn for each sample collected. Segregate land use areas on the property into zones as described in Section 4. To reduce dust generation during sampling, use a sprayer with DI water to wet each sub-sample location prior to collection. Use the trowel to check beneath the surface soil layer, but do not advance more than 6 inches. If VV is observed, record the information on the field sketch or design drawing. If VV is observed within a large SUA, do not collect a sample from the area containing VV as described above.

Within each zone, select 30 sub-sample locations equidistant from each other. These 30 sub-sample locations will comprise the 30-point composite sample for that zone. All composite sub-samples will originate from the same land use area. For example, do not mix sub-samples from SUAs with sub-samples from LUAs.

Clean the sub-sample locations of twigs, leaves, and other vegetative material that can be easily removed by hand. Using the trowel or push probe, excavate a hole in the soil approximately 2 inches in diameter and 6 inches deep for SUAs, or 3 inches deep for non-SUAs, while placing the excavated material directly inside the gallon-sized zip-top plastic bag. Repeat this step for each subsequent sub-sample until the appropriate number of composite sub-samples has been collected. As each sub-sample is collected, inspect the location for VV as prescribed in the SOP for Semi-Quantitative Visual Estimation of Vermiculite in Soil, Revision 1 (CDM 2007a).

Samples collected from zones measuring greater than 3,000 ft² will require additional PIs to inspect the soil for VV, but no more than 30 sub-samples will be collected from a zone for each composite sample. Samples collected from zones measuring less than 3,000 ft² will have the same number of sub-samples as PIs unless additional PIs are required to identify the extent of localized VV.

Homogenize the sample as required by governing guidance documents. Once the sample is homogenized, fill the zip-top plastic bag to 1/3rd full (approximately 2000 grams). Affix the sample index ID label to the inside of the bag and write the index ID number on the outside of the bag, or affix an additional label using clear packing tape. Sample index ID numbers will be assigned based on the investigation-specific guidance document. Double bag the sample and repeat the labeling process for the outer bag. Decontaminate equipment between composite samples as described in Section 8.

Repeat steps outlined above until all samples from a property have been collected.

Soil field duplicate samples will be collected at the rate specified in governing guidance documents. Field duplicate samples will be collected as samples co-located in the same zone. The duplicate will be collected from the same number of sub-samples as the parent sample, but the sub-sample locations of the duplicate sample will be randomly located in the zone. The inspection for VV at each sub-sample location will follow the same protocol as referenced above. These samples will be independently collected with separate sampling equipment or with the original sampling equipment after it has been properly decontaminated. For tracking purposes, the parent/ duplicate sample relationship will be recorded in accordance with sample documentation requirements stated in the governing guidance document. These samples will be used to determine the variability of sample results in a given land use area. These samples will not be used to determine variability in sampling techniques.

Section 6

Site Cleanup

IDW will be managed as prescribed in Section 3.2.10 of the Site-wide QAPP [SWQAPP] (CDM 2007b) or other applicable governing guidance documents. In general, replace the soil plug with excess sample volume. The soil should be placed back into the hole and tamped down lightly. If sandy areas such as playgrounds are sampled, refilling the soil plug is not necessary.

Rinse water, the roots of vegetation removed during sampling, and any excess soil volume may be returned to the sampled area.

Section 7

Documentation

A field logbook/PDA will be maintained by each individual or team that is collecting samples as prescribed in Section 3.2.4 of the SWQAPP (CDM 2007b) or other applicable governing guidance documents. Guidance documents will detail conditions which require attention, but at a minimum the following information should be collected:

- Project name
- Title of governing documents
- Property address
- Date
- Time
- Team members

- Weather conditions
- PPE used
- Locations of any samples or sub-samples that could not be acquired
- Descriptions of any deviations to the SAP or SOP and the reason for the deviation
- Relinquishment of samples to project sample coordinator

Complete required documentation as detailed in applicable governing guidance documents.

Section 8

Quality Assurance/Quality Control

Quality control samples will include:

- Field duplicates

Detailed information on QC sample collection and frequency is prescribed in Section 3.1.3.2 of the SWQAPP (CDM 2007b) or other applicable governing guidance documents.

Section 8

Decontamination

All sampling equipment must be decontaminated prior to reuse. Specific instructions on sample equipment decontamination are included in the applicable governing guidance documents. In general, the procedure to decontaminate all soil sampling equipment is outlined below:

- Remove all visible contamination with plastic brush
- Use DI water and plastic brush to wash each piece of equipment
- Remove excess water present on the equipment by shaking
- Use a paper towel to dry each piece of equipment
- Wrap dried equipment in aluminum foil

Once a week all soil sampling equipment will be cleaning using Alconox and DI water.

Spent wipes, gloves, aluminum foil, and PPE must be disposed of or stored properly as IDW, specified in Section 3.2.10 of the SWQAPP (CDM 2007b) or other applicable governing guidance documents.

Section 9

Sample Custody

Field sample custody and documentation will follow the requirements described in Section 3.2.11 of the SWQAPP (CDM 2007b) or other applicable governing guidance documents.

Section 10

Glossary

Governing guidance documents - The written document that spells out the detailed site-specific procedures to be followed by the project leader and the field personnel for completing specific investigations. These documents will clearly indicate specific requirements for the implementation of this SOP.

Libby Superfund Site - The Libby Superfund Site contains all buildings and land within the boundaries of each operable unit (OU) of the site and illustrated on the most recent version of the OU boundary map.

Sub-sample - The actual location at which the sample is taken. The dimension of a sample point is 2 inches across by 3 inches deep (6 inches for SUAs).

Composite Sampling - A sample program in which multiple sample points are compiled together and submitted for analysis as a single sample.

Land Use Area - A section of property segregated by how the property owner uses the area. The area can be classified as a SUA, LUA, CUA, ISA, or NUA.

Section 11

References

CDM. 2007a. Semi-Quantitative Visual Estimation of Vermiculite in Soils at Residential and Commercial Properties, Revision 1. CDM-LIBBY-06.

CDM. 2007b. Site-Wide Quality Assurance Project Plan. Draft in review.

Control of Measurement and Test Equipment

SOP 5-1

Revision 7

Date: December 31, 2004

Prepared: Dave Johnson

Technical Review: Mike Clark

QA Review: Doug Updike

Approved: *Michael C. Mally* 12/21/04

Issued: *[Signature]* 12/24/04

Signature/Date

Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to establish the baseline requirements, procedures, and responsibilities inherent to the control and use of all measurement and test equipment (M&TE). Contractual obligations may require more specific or stringent requirements that must also be implemented.

2.0 Background

2.1 Definitions

Traceability - The ability to trace the history, application, or location of an item and like items or activities by means of recorded identification.

2.2 Discussion

M&TE may be government furnished (GF), rented or leased from an outside vendor, or purchased. It is essential that measurements and tests resulting from the use of this equipment be of the highest accountability and integrity. To facilitate that, the equipment shall be used in full understanding and compliance with the instructions and specifications included in the manufacturer's operations and maintenance and calibration procedures and in accordance with any other related project-specific requirements.

2.3 Associated Procedures

- CDM Federal (CDM) Technical SOP 4-1
- CDM Quality Procedures (QPs) 2.1 and 2.3
- Manufacturer's operating and maintenance and calibration procedures

3.0 Responsibilities

All staff with responsibility for the direct control and/or use of M&TE are responsible for being knowledgeable of and understanding and implementing the requirements contained herein as well as any other related project-specific requirements.

The project manager (PM) or designee (equipment coordinator, quality assurance coordinator, field team leader, etc.) is responsible for initiating and tracking the requirements contained herein.

4.0 Required Equipment

- Determine and implement M&TE related project-specific requirements
- The maintenance and calibration procedures must be followed when using M&TE
- Obtain the maintenance and calibration procedures if they are missing or incomplete
- Attach or include the maintenance and calibration procedures with the M&TE
- Prepare and record maintenance and calibration in an Equipment Log or a Field Log as appropriate (Figure 1)
- Maintain M&TE records
- Label M&TE requiring routine or scheduled calibration (when required)
- Perform maintenance and calibration using the appropriate procedure and calibration standards
- Identify and take action on nonconforming M&TE

5.0 Procedures

5.1 Determine if Other Related Project-Specific Requirements Apply

For All M&TE:

The PM or designee shall determine if M&TE related project-specific requirements apply. If M&TE related project-specific requirements apply, obtain a copy of them and review and implement as appropriate.

5.2 Obtain the Operating and Maintenance and Calibration Documents

For GF M&TE that is to be procured:

Requisitioner - Specify that the maintenance and calibration procedures be included.

For GF M&TE that is acquired as a result of a property transfer:

Receiver - Inspect the M&TE to determine whether maintenance and calibration procedures are included with the item. If missing or incomplete, order the appropriate documentation from the manufacturer.

For M&TE that is to be rented or leased from an outside vendor:

Requisitioner - Specify that the maintenance and calibration procedures, the latest calibration record, and the calibration standards certification be included. If this information is not delivered with the M&TE, ask Procurement to request it from the vendor.

5.3 Prepare and Record Maintenance and Calibration Records

For all M&TE:

PM or Designee - Record all maintenance and calibration events in a Field Log unless other project-specific requirements apply.

For GF M&TE only (does not apply to rented or leased M&TE):

If an Equipment Log is a project specific requirement, perform the following:

Receiver - Notify the PM or designee for the overall property control of the equipment of the receipt of an item of M&TE.

PM or Designee - Prepare a sequentially page numbered Equipment Log for the item using the maintenance and calibration form (or equivalent) from the *CDM Property Control Manual* (Figure 1).

PM or Designee and User - Record all maintenance and calibration events in an Equipment Log.

5.4 Label M&TE Requiring Calibration

For GF M&TE only (does not apply to rented or leased M&TE):

If calibration labeling is a project specific requirement, perform the following:

PM or Designee - Read the maintenance and calibration procedures to determine the frequency of calibration required.

PM or Designee - If an M&TE item requires calibration before use, affix a label to the item stating "Calibrate Before Use."

PM or Designee - If an M&TE item requires calibration at other scheduled intervals, e.g., monthly, annually, etc., affix a label listing the date of the last calibration, the date the item is next due for a calibration, the initials of the person who performed the calibration, and a space for the initials of the person who will perform the next calibration.

5.5 Operating, Maintaining or Calibrating an M&TE Item

For all M&TE:

PM or Designee and User - Operate, maintain, and calibrate M&TE in accordance with the maintenance and calibration procedures. Record maintenance and calibration actions in the Equipment Log or Field Log.

Control of Measurement and Test Equipment

SOP 5-1

Revision: 7

Date: December 31, 2004

Figure 1

CDM

A subsidiary of Camp Dresser & McKee Inc.

Maintenance and Calibration

Date: _____ Time: _____ (AM/PM)

Employee Name: _____

Equipment Description: _____

Contract/Project: _____

Equipment ID No.: _____

Activity: _____

Equipment Serial No.: _____

Maintenance

Maintenance Performed: _____

Comments: _____

Signature: _____

Date: _____

Calibration/Field Check

Calibration Standard: _____

Concentration of Standard: _____

Lot No. of Calibration Standard: _____

Expiration Date of Calibration Standard: _____

Pre-Calibration Reading: _____

Post-Calibration Reading: _____

Additional Readings: _____

Additional Readings: _____

Additional Readings: _____

Additional Readings: _____

Pre-Field Check Reading: _____

Post-Field Check Reading: _____

Adjustment(s): _____

Calibration: ☐ Passed ☐ Failed

Comments: _____

Signature: _____

Date: _____

Control of Measurement and Test Equipment

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5.6 Shipment

For GF M&TE:

Shipper - Inspect the item to ensure that the maintenance and calibration procedures are attached to the shipping case, or included, and that a copy of the most recent Equipment Log entry page (if required) is included with the shipment. If the maintenance and calibration procedures and/or the current Equipment Log page (if required) is missing or incomplete, do not ship the item. Immediately contact the PM or designee and request a replacement.

For M&TE that is rented or leased from an outside vendor:

Shipper - Inspect the item to ensure that the maintenance and calibration procedures and latest calibration and standards certification records are included prior to shipment. If any documentation is missing or incomplete, do not ship the item. Immediately contact Procurement and request that they obtain the documentation from the vendor.

5.7 Records Maintenance

For GF M&TE:

PM or Designee - Create a file upon the initial receipt of an item of M&TE or calibration standard. Organize the files by contract origin and by M&TE item and calibration standard. Store all files in a cabinet, file drawer, or other appropriate storage media at the pertinent warehouse or office location.

PM or Designee - Maintain all original documents in the equipment file except for the packing slip and Field Log.

Receiver - Forward the original packing slip to Procurement and a photocopy to the PM or designee.

PM or Designee - File the photocopy of the packing slip in the M&TE file.

PM or Designee and User - Record all maintenance and calibration in an Equipment Log or Field Log (as appropriate.) File the completed Equipment Logs in the M&TE records. Forward completed Field Logs to the PM for inclusion in the project files.

For M&TE rented or leased from an outside vendor:

Receiver - Forward the packing slip to Procurement.

User - Forward the completed Field Log to the PM for inclusion in the project files.

User - Retain the most current maintenance and calibration record and calibration standards certifications with the M&TE item and forward previous versions to the PM for inclusion in the project files.

5.8 Traceability of Calibration Standards

For all items of M&TE:

PM or Designee and User - When ordering calibration standards, request nationally recognized standards as specified or required. Request commercially available standards when not otherwise specified or required. Or, request standards in accordance with other related project-specific requirements.

PM or Designee and User - Require certifications for standards that clearly state the traceability.

PM or Designee and User - Note standards that are perishable and consume or dispose of them on or before the expiration date.

PM or Designee - Require Material Safety Data Sheet to be provided with standards.

Control of Measurement and Test Equipment

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5.9 M&TE That Fails Calibration

For any M&TE item that cannot be calibrated or adjusted to perform accurately:

PM or Designee - Immediately discontinue use and segregate the item from other equipment. Notify the appropriate PM and take appropriate action in accordance with the CDM QP 2.3 for nonconforming items.

PM or Designee - Review the current and previous maintenance and calibration records to determine if the validity of current or previous measurement and test results could have been affected and notify the appropriate PM(s) of the results of the review.

6.0 Restrictions/Limitations

On an item-by-item basis, exemptions from the requirements of this SOP may be granted by the HDQ health and safety manager and/or HDQ quality assurance director. All exemptions shall be documented by the grantor and included in the equipment records as appropriate.

7.0 References

CDM Federal Programs Corporation *Property Control Manual*. 2002. March.

Site-Specific Sampling Guidance Libby Superfund Site

SOP No.: CDM-LIBBY-06, Revision 1

SOP Title: Semi-Quantitative Visual Estimation of Vermiculite in Soils at Residential
and Commercial Properties

Approved by:



Technical Reviewer

5/10/07

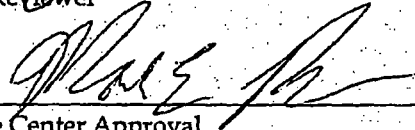
Date



QA Reviewer

5/10/07

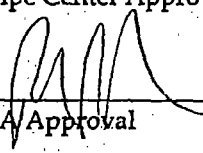
Date



Volpe Center Approval

05/10/07

Date



EPA Approval

5/10/07

Date

Section 1

Purpose

EPA will identify and delineate the extent of any visible vermiculite (VV) present in soils as part of all investigations conducted at the Libby Superfund Site and specified in governing guidance documents. The goal of this standard operating procedure (SOP) is to provide a consistent approach to identify and characterize any VV present in soils.

The semi-quantitative approach presented in this SOP for visually estimating VV in soil will be revised as required to optimize data collection as the sampling teams gain experience. This will be accomplished by expanding and/or improving this SOP, supporting pictorial standards, and additional electronic data acquisition efforts, as necessary.

Section 2

Definitions

Specific Use Area (SUA) - Discrete exterior parcels on a property with a designated specific use. Due to the nature of activities typically carried out in SUAs, residents may be especially vulnerable to exposures when Libby amphibole asbestos (LA) contaminated soil becomes airborne. SUAs may be bare or covered with varying amounts of vegetation. SUAs include:

- Flower Pot
- Flowerbed
- Garden
- Stockpile
- Play Area
- Dog Pen
- Driveway (non-paved)
- Parking Lot (non-paved)
- Road (non-paved)
- Alley (non-paved)

Common Use Area (CUA) - Exterior parcels on a property with varied or generic use. CUAs may be bare or covered with varying amounts of vegetation. CUAs include:

- Walkway
- Yard (front, back, side, etc.)
- Former Garden
- Former Flowerbed

Limited Use Area (LUA) – Exterior parcels on a property that are accessed, utilized, and maintained on a very limited basis. LUAs may be bare or covered with varying amounts of vegetation. LUAs include:

- Pasture
- Maintained/Mowed Fields
- Underneath porches/decks¹
- Overgrown Areas (with trails/footpaths, or between SUAs/CUAs)

Interior Surface Area (ISA) – Interior soil surfaces of buildings such as garages, pumphouses, sheds, and crawlspaces.

Non-Use Area (NUA) – Exterior parcels on a property with no current use (e.g., areas that are un-maintained and not accessed). NUAs may be bare or covered with varying amounts of vegetation. NUAs include:

- Wooded Lots
- Un-maintained Fields

Since NUAs are not currently accessed, they are not presently considered a complete exposure pathway. As such, semi-quantitative visual estimates of vermiculite in soil will not be captured at this time. However, to the extent that NUAs may become a complete exposure pathway in the future, EPA may revisit these NUAs at a later date.

Zone² – Parcels on a property that share a similar land use or subdivisions of a land use area based on site conditions (e.g., access, construction setup considerations, etc.) or sampling requirements. No area type may be combined with any other area type. For example, driveways and flowerbeds are both SUAs but will be separated into unique zones for visual inspection. Similarly, large CUAs such as yards may be subdivided into front yard, side yard, and back yard zones dependent on site conditions. Sectioning properties into additional zones will be at the discretion of the field team leader but consistent among the teams.

It is anticipated that SUAs and ISA zones will generally tend to be smaller parcels. Combining small, proximal SUAs into one zone will be at the discretion of the field team leader but consistent among teams. No ISA will be combined with any other ISA for visual inspection. There is not a maximum square footage restriction on any zone.

¹ The soils underneath porches and decks will be classified as LUAs depending on ground clearance and accessibility to homeowners and pets. If these areas are not accessible, they will be classified as NUAs.

² The restriction on the maximum square footage of SUA zones (1,000 ft²) and non-SUA zones (2, 500 ft²) was eliminated from the previous iteration of this SOP after the data were reviewed by EPA and determined to sufficiently characterize the presence of VV regardless of zone square footage. Additionally, this will allow the flexibility necessary for field teams to identify areas of zones most cost effectively for removal purposes.

Point Inspection (PI) – Used in SUA, CUA, LUA, and ISA zones. A PI is an intrusive visual inspection of the top portions of the soil at a randomly selected point within a zone. A PI consists of the active displacement of the surface soil with a small shovel and visual inspection of the displaced soil to determine if VV is present. If VV is observed during the PI, the location and a semi-quantitative estimate of VV contamination will be recorded.

Section 3

Applicability

This SOP applies to properties within the Libby Superfund Site at varying stages of the removal process including, but not limited to, all screening and risk-based investigations, pre-design inspections, and removal actions. Investigation-specific modifications to this SOP are outlined in the governing guidance document for each investigation. The following locations on a property will be evaluated for the presence/absence of VV:

- All parcels on a property where soil samples are being collected.
- All parcels on a property where soil was non-detect for LA during previous sampling activities.
- All SUA parcels on a property that have not been previously characterized as containing VV

Section 4

Procedure

Figure 1 illustrates the procedures and decision rules for this SOP. The three primary procedural steps are listed below:

- Establish zones
- Perform PI
- Perform semi-quantification of visual vermiculite

Each is described in the following subsections.

4.1 Establish Zones

Upon arrival at the property, the field team will locate all areas requiring sample collection (i.e., where previous soil sample results were non-detect for LA or SUAs have not been previously characterized for VV). Parcels will be identified as SUA zones, CUA zones, LUA zones, NUA zones, or ISA zones. The field team will measure the zone sizes and note them on the field sketch and/or design drawings. Zones will be assigned according to the definitions provided above.

4.2 Point Inspections³

As defined above, a PI is an intrusive visual inspection performed for the entire surface of a zone. Professional judgment may be used to determine the exact location of PIs; however, the following guidelines will be implemented to maintain consistency.

A minimum of 30 PIs will be evaluated per zone if sampling is required within that zone. If soil sampling is not required, a minimum of 5 PIs will be evaluated within each zone. Zones larger than 500 square feet (ft²) will require evaluation at a minimum of 1 PI per 100 ft² (10 ft by 10 ft area). The PI locations will be randomly selected and will be spatially representative of the entire zone. Locations of the PIs and semi-quantitative estimates of VV (i.e., low, intermediate, or high) will be recorded on the field sketch for each PI. While a minimum of 5 PIs will be conducted per zone, there is no set maximum. Rather, the maximum number of PIs is variable—dependent upon the total area of the zone and achieving the minimum required frequency of 1 PI per 100 ft².

The following sections outline procedures for inspecting each use area (e.g., SUA, CUA, LUA, ISA). The procedure for semi-quantification of VV is provided in the next section.

SUA Zone:

- Visually inspect the PI point using a spade or trowel to remove any cover material, including excess debris (e.g., mulch, rock, etc.) and organic material, from the surface of the soil. Remove and visually inspect soil to a depth of 0-6 inches below ground surface⁴.
- If a depth of 6 in. cannot be attained given the varying levels of compaction in driveways, roads, etc. the maximum depth attainable will be documented in the field logbook.
- Record semi-quantitative estimate of VV observed as described in the following section.
- Replace soil and cover material.
- Repeat as necessary employing procedure outlined above.

CUA and LUA Zones:

- Visually inspect the PI point using a spade or trowel, carefully removing organic material, including grass, from the surface of the soil. Remove and visually inspect soil to a depth of 0 - 3 inches below ground surface⁵.

³ Surface Inspections- The non-intrusive visual inspection of the immediate surface of a zone was eliminated from the previous iteration of this SOP after their data were reviewed and determined by EPA to provide no additional information over that gained through Point Inspections.

⁴ A soil depth of 6 inches for SUAs was chosen to approximate the depths to which digging would be expected during typical activities occurring in these SUA zones (e.g., gardening, child digging in dirt, etc.)

⁵ A soil depth of 0-3 inches was chosen to approximate the depths to which soil disturbance would be most likely during typical activities occurring in these CUA and LUA zones (e.g., lawn mowing, etc.)

- Record semi-quantitative estimate of VV observed as described in the following section.
- Carefully replace all soil and organic material.
- Repeat as necessary employing procedure outlined above.

ISA Zone:

- Move items as necessary to access the soil surface.
- Visually inspect the PI points using a spade or trowel, remove and visually inspect soil to a depth of 0 - 3 inches below ground surface⁶.
- Record semi-quantitative estimate of VV observed as described in the following section.
- Repeat as necessary employing procedure outlined above.

If during the PI, VV is observed to be localized within a zone, the portion with vermiculite will be denoted on the field sketch. If additional PIs are necessary to determine the boundaries of the area, approximately 10 to 20% additional PIs will be evaluated to determine the extent of localized vermiculite.

4.3 Semi-Quantification of Visual Vermiculite

During PI, the field team will estimate the quantity of vermiculite observed. Each PI location for all zones will be assigned a semi-quantitative estimate of visible vermiculite content using a 4-point scale: none (blank), low (L), intermediate (M), and high (H)⁷. For PI locations where VV is observed, semi-quantitative estimates (e.g., L, M, or H) will be recorded on the field sketch. PI locations where VV is not observed will not be recorded on the field sketch. Photographs illustrating these quantities are attached to this SOP as Figure 2. Additionally, jars of vermiculite-containing soils representing these three levels will be available for training and reference.

Under the current version of this SOP, there will be no effort to design an approach to combine vermiculite levels for PIs within or among zones. While the viability of combining semi-quantitative visual estimates within or among zones may be assessed as a pilot-scale evaluation, any PI with visible vermiculite qualifies as vermiculite-containing soil for the area represented by the inspection point or inspection zone.

⁶ A soil depth of 0-3 inches was chosen to approximate the depths to which soil disturbance would be most likely during typical activities occurring in these IS zones (e.g., entering crawlspace, retrieving items from shed, etc.)

⁷ Based on EPA's review of previous data, the 5-level scale VV identification scheme was not meaningful and will be reduced to a 4-level scale. As such the quantity of "Gross" VV in the previous iteration of this SOP was combined with High. Previously collected data of Gross VV should be considered analogous to High VV under this revised SOP.

Section 5

Health & Safety/Engineering Controls

All personnel will carry out visual inspections in accord with proper personal protective equipment (PPE) and other monitoring/governing requirements outlined in the most recent version of the Site Health and Safety Plan governing the work being conducted.

All visual inspections will employ appropriate engineering controls to minimize dust (e.g., wetting soil during inspection) as prescribed in the Site-Specific Standard Operating Procedure for Soil Sample Collection (CDM-LIBBY-05, Revision 2).

Section 6

Equipment Decontamination

Equipment decontamination is not required between each PI from the same zone, but is required before moving to another inspection zone. Decontamination of equipment will be conducted as required by the governing guidance documents.

Section 7

Documentation

As noted above, information about the presence of vermiculite will be recorded on the field sketch or design drawing for the property under investigation. Each zone will be marked with:

- Zone type (i.e., SUA, CUA, LUA, NUA, or ISA)
- Zone area in ft²
- PI locations/points
- Semi-quantitative estimate of VV content for each PI (i.e., L, M, H)

In addition to field sketch/design drawing documentation, each field team will generate a Visual Vermiculite Estimation Form (VVEF) (Figure 3) to document the semi-quantitative visual estimates of VV for each PI for possible future information use. This form will be managed according to governing guidance documents.

Section 8

Training

Every effort will be made to ensure consistency in the semi-quantitative evaluation of VV in soil to the extent possible. This will include training (e.g., field calibration), specimen examples (i.e., jars/photographs of low, intermediate, and high quantities of vermiculite, etc.), designated field staff, and oversight by the field team leader. Figures illustrating none, low, intermediate, and high quantities of vermiculite are attached to this SOP for reference (Figure 2).

To ensure consistency over time, the field team leader will verify semi-quantitative assignments at a rate of one property per team per week. The field team leader will sign off on those field sketches that were verified. If inconsistencies are noted, the field team leader will hold re-training with all teams participating simultaneously. Updates to the SOP and its attached specimen examples will occur as necessary and the EPA Project Team Leader and Technical Assistance Unit will be notified when these updates are recommended by the field team leader or field investigation manager.

Figure 1 – Visible Vermiculite Inspection Process

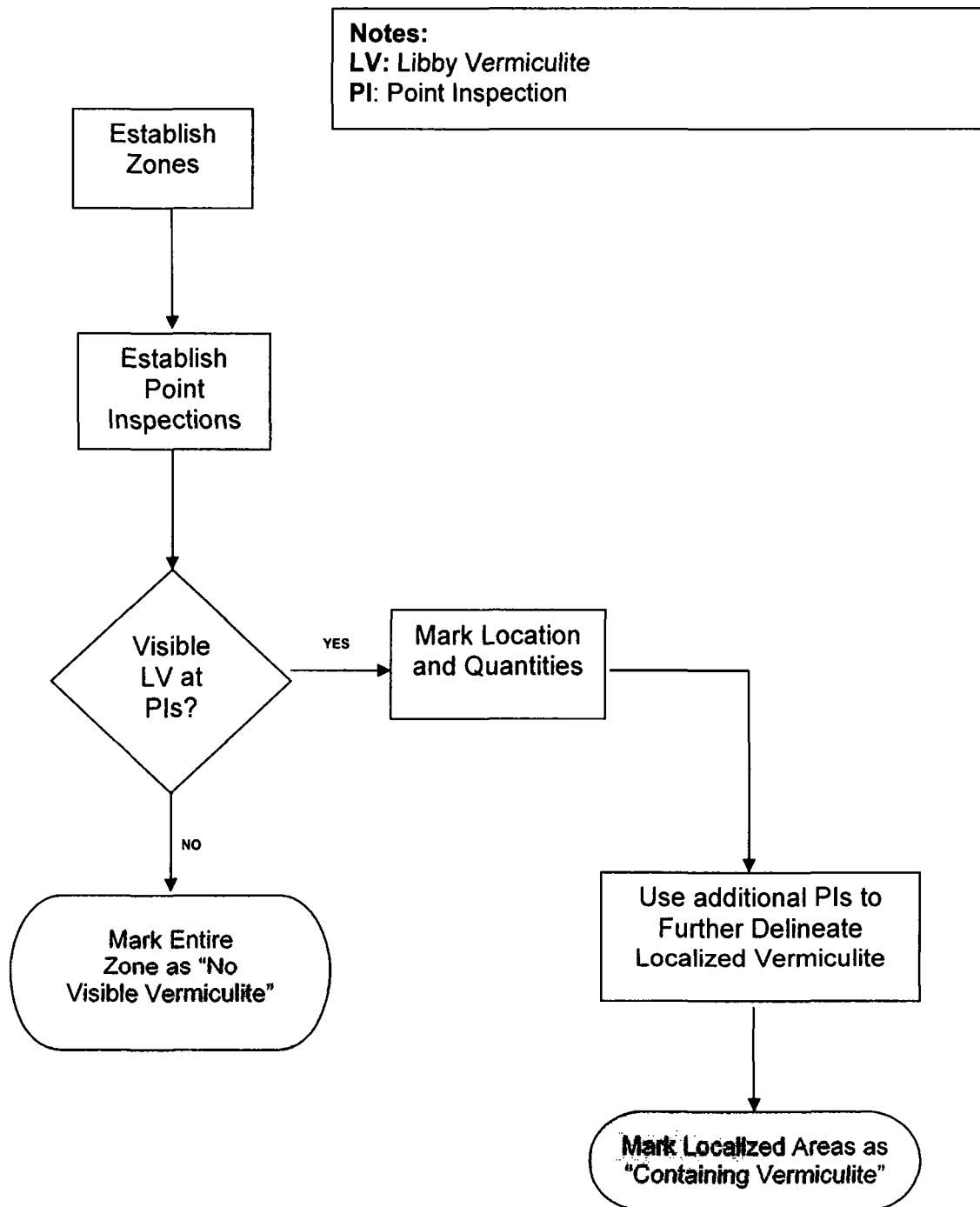




Figure 2a: Low Visible Vermiculite – A maximum of a few flakes of vermiculite observed within a given visual inspection point



Figure 2b: Intermediate Visible Vermiculite – Vermiculite easily observed throughout visual inspection point, including the surface.



Figure 2c: Intermediate Visible Vermiculite – Vermiculite easily observed throughout visual inspection point, including the surface.



Figure 2d: High Visible Vermiculite – Vermiculite easily observed throughout visual inspection point, including the surface.

LIBBY SUPERFUND SITE
Visual Vermiculite Estimation Form (VVEF)

Field Logbook No.: _____ Page No.: _____ Site Visit Date: _____ BD Number: _____
 Address: _____ Structure Description: Property
 Occupant: _____ Phone No.: _____
 Owner (If different than occupant): _____ Phone No.: _____
 Investigation Team: _____ Investigation Name: _____
 Field Form Check Completed by (100% of Forms): _____ Visual Verification by Field Team Leader (10% of forms): _____

		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Type (SUA/CUA/LUA/IS)									
Description									
Area Size (square feet)									
General Comment (Cover, etc.)									
Pls (X=None, L=Low, M=Intermediate, H=High)	X								
	L								
	M								
	H								
Total		0	0	0	0	0	0	0	0

Areas previously identified for removal not inspected for visible vermiculite?

Yes No NA

Location(s):

Project-Specific Standard Operating Procedure Libby Asbestos Project

SOP No.: CDM-LIBBY-09, Revision 0

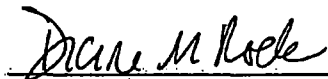
SOP Title: Global Positioning Satellite (GPS) Coordinate Collection and Handling

Project: Libby Asbestos Project

Project No.: 2616

Client: U.S. Department of Transportation (DOT)/Volpe Center

Authored by:

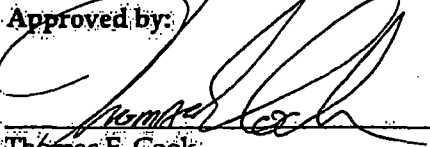


Diane Rode

CDM Libby IMS Support

Date: 5-21-07

Approved by:



Thomas E. Cook

CDM Technical Reviewer

Date: 5/21/07



Terry Crowell

CDM Quality Assurance Reviewer

Date: 5/21/07

1.0 Objective

The objective of this standard operating procedure (SOP) is to provide a standardized approach for the collection and handling of GPS data at the Libby Asbestos Site (Site).

2.0 Background

2.1 Definitions

Libby_Sampling Data Dictionary - All Trimble handheld units used at the Site are pre-programmed with the Libby_Sampling data dictionary, specific to the spatial data collection needs for the Libby Asbestos Project. All personnel required to collect GPS data will be familiar with the contents of the Libby_Sampling data dictionary, which contains the following features: Soil Sample, Air Sample, Dustfall (Settled Dust) Sample, Water/Sediment Sample, Building Location, Interest Point, Sample Area, and Interest Area. The Trimble units also are loaded with a generic data dictionary that handles collection of generic lines, points and areas.

2.2 Discussion

The following attributes are required to be collected as indicated in Table 1 for each feature type when a GPS coordinate is collected:

Table 1 – Attributes Collected in the Libby_Sampling Data Dictionary	
Feature Name	Attributes Collected
Building Location	LocationID, Address, Comments
Soil Sample	LocationID, IndexID, Sample_Type, SamplGroup, Upper_Depth, Lower_Depth, Comment
Air and Dustfall Samples	LocationID, IndexID, Sample_Type, SamplGroup, Comment
Water/Sediment Sample	LocationID, IndexID, Matrix_Type, Comment
Interest Point	Location, Land_Use, Comment
Interest Area	Location, Land_Use, Comment
Sample Area	LocationID, IndexID, Num_of_Composites, Upper_Depth, Lower_Depth, Comment

These attributes are discussed in detail in Section 4 of this document.

3.0 Responsibilities

GPS data is collected by investigation, pre-design, and removal oversight staff as specified in the sampling and analysis plans specific to those programs. Transfer of GPS data from the field

equipment to the onsite server, as well as initial data review, processing, and transmittal of data off-site will be performed by a designated on-site IMS staff member during peak field season (April through November), and by administrative support staff during the off season. These additional procedures are documented separately and are posted on CDM's e-room at: https://team.cdm.com/eRoom/R8-RAC/Libby/0_290a.

4.0 Procedures

The following sections describe how GPS points are collected and handled for features commonly used at the Site.

4.1 GPS Point Collection

Building Locations

For building locations, a GPS point is collected near the front door or main entrance of the building. Location IDs beginning with the prefix "BD" (indicating a building point), are used for such locations.

Soil Samples

For Grab samples, a GPS point is collected directly above the location where each sample is collected. Location IDs beginning with the prefix "SP" (indicating a sample point), are used for such locations.

For Composite samples, a GPS point is collected at the approximate center of each sample area. In the case of an irregular-shaped sample area or sample area that is non-continuous (e.g., a flowerbed that wraps around a house), a GPS point is collected at the center of the largest continuous sample area. Location IDs beginning with the prefix "SP" are used for such locations.

Outdoor Stationary Air and Dustfall (Settled Dust) Samples

For permanent (i.e., samples represent a consistent monitoring zone or area and are collected on a routine schedule) outdoor stationary air and dustfall sample locations, a GPS point is collected at each unique sample location. All subsequent samples taken at that location will be assigned the same Location ID and X,Y coordinates. The GPS point is only collected once. Location IDs beginning with the prefix "SP" (indicating a sample point), are used for such locations.

GPS points are not collected for the following features:

- Stationary air, dust, and soil samples collected inside or beneath structures (locations are associated with the X,Y coordinate of the building where the sample was collected)
- Stationary air samples, with the exception of permanent monitoring locations as designated in site-specific removal work plans or Response Action Work Plan Addenda
- Duplicate or Replicate air or dust samples (assigned the same location ID as the parent sample)
- Soil samples taken at depth from the same X,Y location as a previously collected sample. The at-depth soil sample will be assigned the same Location ID as the shallower sample in order to relate both samples to the same X,Y coordinate.
- Duplicate or split soil samples (assigned the same location ID as the parent sample)
- Personal air samples (locations are associated with the X,Y coordinate of the building or property where the sample was collected)

Interest Point, Interest Area, Sample Area

GPS points for these features are not routinely collected on the Libby Asbestos Project. However, they are included in the Libby_Sampling data dictionary in the event that a GPS point is collected for an area where no sampling is involved, or a series of points is collected to document the perimeter of an interest area or sample area.

4.2 Operation of Trimble Pro XRS and GeoXT Handheld Units:

Operators must be standing at the sample location *before* the unit starts to collect positions. Once the unit has started collecting positions, the operator must remain standing at the sample location until the minimum required positions have been collected. A minimum of 30 positions will be collected for each GPS location. More positions will be required in circumstances where the position dilution of precision (PDOP) is greater than the default setting of 4.5. Plan GPS collection around satellite availability & times when PDOP is < 4.5.

Record-keeping Requirements:

Serial numbers of the Trimble datalogger, receiver, and antenna will be recorded in a field logbook. GPS filenames will be recorded in the logbook and on field sample data sheets (FSDSs).

Data Collection Instructions for Trimble Pro XRS:

Turn on the unit and select *Data Collection* from the main menu. You will be prompted to create a new file, open an existing file, or create a base file. Choose *create new file* and press Enter. There will be a generic default file name that begins with "RO..." followed by the date. Create a new file name using the following naming convention: T1A10204, where T1 refers to the specific Trimble unit you are using, A refers to the first file of the day (B would be the second file of the day, and so on), and 10204 refers to October 20, 2004. You are limited to only 8 characters so the date notation will be MMDDYY. The setting for data dictionary should always be set to Libby_Sampling. Press Enter to bring up the Start Feature menu.

From the Start Feature menu you will select the type of location data that you want to collect. Press the F1 key to pause the unit until you are ready to start collecting data. Highlight the appropriate data type and press Enter. (Note, if you do not have the unit paused it will start collecting data as soon as you press Enter.) Using the alphanumeric keypad and the directional keypad enter the *Index* and *Location ID* exactly as they appear on the printed labels. Under the *Sample Type* field you will see an arrow indicating a drop-down menu with preset options. If you scroll to the right while *Sample Type* is highlighted you will see the available options. Select the option you want and then scroll to the right again to exit the drop down menu.

Enter any additional information such as Owner, Sample Grid, Sample Location, etc. in the *Comments* field. Press the F1 key to *resume* collecting positions. The unit will beep for every position it collects displaying the total positions in the lower right corner. After the counter has reached the desired number of positions (30 positions), press Enter and then F1 to confirm and save your data point. Repeat this process for every new location.

Review all entries and correct any mistakes before downloading. You can view and edit the data you have collected by pressing F2 (*Review*) from the Start Feature menu. Use the directional pad to scroll through the locations and press Enter to view the sample information.

If changes are made to the data, be sure to press Enter to save the changes, otherwise just press Esc. Press F2 (*New*) to return to the Start Feature menu.

Additional useful handheld features:

- **Review feature** – allows you to quickly view keyed data for errors, making changes as necessary.
- **Repeat feature** – saves time & reduces keystroke errors when collecting multiple samples of the same type.
- **Offset** – reduces the headache and extra time associated with trying to capture GPS data under bridges, large trees, porches, facades and awnings, or while standing close to a building or other object that can deflect satellites signals from the GPS receiver.
- **Delete Feature** – allows you to delete a feature from a file if, for example, no positions were collected or the sample is voided. This will save time & confusion during the QC process.
- **Rename File** – will allow you to browse through the file names you have created, and quickly edit them if necessary. This will save time if it is done *before* the files are downloaded.
- **Delete File** – will allow you to delete a file from the handheld when necessary. This will save time during the QC process if it is done *before* the files are downloaded.

Data Collection Instructions for Trimble GeoXT:

Turn on the unit and with the stylus, select GPS from the lower right menu. This will open the Terra Sync software. Wait for the GPS status screen to recognize at least 4 satellites. Depending on your location, this can take several minutes. If you do not wait long enough, you will not succeed in collecting your data. The connected satellite names will appear on the left side of the screen – they will be highlighted to indicate that they are connected. Select *Data* from the drop down menus at upper left. There will be a generic default file name that begins with “RO...” followed by the date. Create a new file name using the following naming convention: T1A10204, where T1 refers to the specific Trimble unit you are using, A refers to the first file of the day (B would be the second file of the day, and so on), and 10204 refers to October 20, 2004. You are limited to only 8 characters so the date notation will be MMDDYY. The setting for data dictionary should always be set to Libby_Sampling. Select *Create*. Confirm the antennae height by selecting *ok*. Highlight the appropriate feature name and select *Create*. The unit will begin logging the point automatically. Enter the attribute data using the stylus and the keyboard icon located at the bottom of the touch screen. When you are finished recording, hit *ok*, which saves the file and location information. If you have other points to collect within the same file, select the *Options* menu then select *Repeat*.

4.3 GPS Data Transfer

GPS File Transfer to Libbysvr02 from Trimble Pro XRS

- Turn on the Trimble Unit
- The unit will try to connect to the GPS receiver - press the Esc button
- Select File Manager
- Select File Transfer - currently the data consists of .ssf files and is transferred to Libbysvr02 \ Pfdata \ Libby - the file is named with an 8character identifier: T+TrimbleUnitNo+ file number(A for first file collected that day)+mmddy
- Open Pathfinder Office

- Select Utilities
- Select Data Transfer
- Select Add
- Select Datafile - *Pathfinder will search for a connection to the Trimble Unit*
- Connect the cable from the computer to the Trimble Unit
- A list of files will appear when the connection is complete
- Select Open
- Select Transfer All
- When the download is complete, close the data transfer window - *if downloading files from several units, close and reopen this window between downloads*
- Delete files from the Trimble Unit - *all of the files will be listed - double check that all the files were transferred to libbysvr02 before deleting*

GPS File Transfer to Libbysvr02 from Trimble Pro GeoXT

The Trimble GeoXT connects to a PC through the charger unit using a USB cable (type A to type B), and Microsoft Active Sync software. (There are Active Sync connection settings to enable or disable once the device is connected to the PC. From the Active Sync menu, select Tools, select Options. These connect the Trimble to other Windows applications on the PC eg; email, task managers, etc. The main reason to disable these settings at Libby, is that the Trimble Units are shared and it does not make sense to activate them.)

- Turn on the Trimble Unit
- Select GPS - from lower right corner (*This opens up the TerraSync GPS software.*)
- Select Setup
- Select Options
- Select Disconnect from GPS
- Select Data
- At the bottom of list, select File Manager
- Open Pathfinder
- Select Utilities
- Select Data Transfer
- From the Device list, select GIS Datalogger on Windows CE
- Click on the connect icon (the button with the checkmark circled in green). *A picture on the right will indicate the connection status.*

4.4 Preliminary On-site Data Quality Control

Following the download of files from the Trimble units, a copy of each file is made and filed in *Libbysvr02 \Pfdata \Libby \RawFiles*. The raw files are not modified but kept as the only copy of the complete set of original downloaded data files. Using the Pathfinder export utility, shapefiles (.shp) of the non-quality control checked (QC'd) files located in *Libbysvr02 \Pfdata \Libby* are exported. These shapefiles are opened in ArcMap. A new export file of the attribute tables from Arcmap is created and saved as a .dbf file, then opened and saved in Excel workbook format. The Excel file is imported as a new table into a recent copy of the Electronic Libby Asbestos Sample Tracking Information Center (eLASTIC). A report is generated linking the index_id of the imported table with the index_id of the eLASTIC sample

table. This report is saved in Excel. An Excel comparison function is used to compare location ids from the GPS files with the eLASTIC Location IDs. Any discrepancies are researched to determine if the error resides on the FSDS, was a data entry error in eLASTIC, or a data entry error in the GPS .ssf file. Errors in the .ssf files are corrected using Pathfinder Office. Files used for this data review process (.shp, .dbf files and .xls files) are not retained. The QC'd .ssf files are then emailed in a .zip file from the Libby Office to off-site GIS staff for processing. The QC'd and .zip files are moved to *Libbysvr02\Pfdata\Libby\QC* and sent zip files.

For reference on using Pathfinder export and ARCMAP attribute tables see Eroom: Libby GIS folder: GPS to GIS procedure posted by Mike Schultz on August 29, 2006.

4.5 Equipment, Software & Configuration

For Trimble Pro XRS or Trimble GeoXT:

Software used

for data transfer: GPS Pathfinder Office 2.90 and 3.10
TerraSync

Software used

for on-site QC: GPS Pathfinder Office 2.90 and 3.10
ArcGIS ArcMap
Microsoft Excel
eLASTIC

Configuration Settings (TSC1 5.27 software)

Software can vary with rental equipment. Some settings can be changed to accommodate data collection needs.

Table - 2 Configuration Settings for Trimble Pro XRS		
GPS Rover Options - Logging Options		
Logging Intervals	Point feature	1 s
	Line / area	3 s
	Not in feature	none
	Velocity	none
Confirm end feature	no	
Minimum Positions	30	
Carrier phase	Carrier mode	off
	Minimum time	10mins
GPS Rover Options – Position Filters		
Position mode	Manual 3D	
Elevation mask	15 degrees	
SNR mask	6.0	
DOP type	PDOP	
PDOP mask	6.0	
PDOP switch	4.0	
GPS Rover Options – Real-time input		
Preferred correction source	use uncorrected GPS	
GPS Rover Options – General real-time settings		
Correction age limit	10s	
GPS Rover Options – Antenna options		
Height	6.000USft	

Measure	Vertical	
Confirm	Never	
Type	Integrated GPS/ Beacon/Sat	
Part number	33580-50	
GPS Rover Options – Initial Position		
North	USft	
East	USft	
GPS Rover Options – 2D altitude		
Altitude(MSL)	USft	
Computed at	time	
Computed at	date	
GPS Base Station Options – Logging Options		
Logging Intervals	Measurements	5s
	Positions	30s
Audible Click	Yes	
Log DOP data	Yes	
GPS Base Station Options – Position Filters		
Position mode	Manual 3D	
Elevation mask	15 degrees	
SNR mask	4.0	
PDOP mask	6.0	
PDOP switch	4.0	
GPS Base Station Options – Real-time output options		
Real-time output mode	off	
Radio type	Custom	
Baud rate	9600	
Data bits	8	
Stop bits	1	
Parity	Odd	
RTCM options	Station	1
	Message type	Type 1
	Message interval	5s
	Message suffix	None
	CTS flow control	Off
	CTS xmit delay	0ms
	RTS mode	High
	RTS edge delay	0ms
GPS Base Station Options – Reference position		
Datum	NAD 1983 (Conus)	
Zone	11 North	
NMEA/TSIP Output options		
Output	TSIP	
Baud rate	38400	
Coordinate System	UTM	
Map display options	All show with no background	
Units and Display		
Units	Distance(2D)	US Survey Ft
	Area	Square feet
	Velocity	Miles/Hour
	Angle format	DDMMSSss
	Order	North/East
	North reference	True
	Magnetic declination	Auto

	Null string	
	Language	English
Time and Date	24 hour clock	Yes
	Time	##.##.##
	Date format	MM/DD/YYYY
	Date	MM/DD/YY weekday
Quickmarks	Attributes	Repeat
	Confirm	No
Hardware(TSC1) software version 5.27		

Table - 3 Libby Sampling Data Dictionary	
"Libby Sampling", Dictionary	
"Soil Sample", point, "", 1, seconds, 1, Code	
"LocationID", text, 30, required, "SP-000001", required, SP-	
"IndexID", text, 30, required, required, Label1	
"Sample_Type", menu, required, required, Label2	
"COMPOSITE", default	
"GRAB"	
"SamplGroup", menu, required, required	
"BARN"	
"BARROW SOURCE"	
"BASEMENT"	
"BLANK"	
"DRIVEWAY"	
"FIELD"	
"FLOWER BED"	
"GARAGE"	
"GARDEN"	
"HOUSE"	
"PARK"	
"PROPERTY"	
"ROAD"	
"SCHOOL"	
"SHED"	
"WALKWAY"	
"YARD", default	
"STOCKPILE"	
"Upper_Depth", text, 30, required, "Inches", required	
"Lower_Depth", text, 30, required, "Inches", required	
"Comment", text, 30, normal, normal	
"Air Sample", point, "", 1, seconds, 1, Code	
"LocationID", text, 30, required, required	
"IndexID", text, 30, required, required, Label1	
"Sample_Type", menu, required, required, Label2	
"PERSONAL"	
"STATIONARY", default	
"SamplGroup", menu, required, required	
"BARN"	
"BARROW SOURCE"	
"BASEMENT"	
"BLANK"	
"DRIVEWAY"	
"FIELD"	

"FLOWER BED"
"GARAGE"
"GARDEN"
"HOUSE", default
"PARK"
"PROPERTY"
"ROAD"
"SCHOOL"
"SHED"
"WALKWAY"
"YARD"
"Comment", text, 30, normal, normal
"Dustfall Sample", point, "", 1, seconds, 1, Code
"LocationID", text, 30, required, required, Label1
"IndexID", text, 30, required, required, Label2
"Sample_Type", menu, required, required
"BUILDING", default
"VEHICLE"
"NA"
"OTHER"
"SamplGroup", menu, required, required
"BARN"
"BARROW SOURCE"
"BASEMENT"
"BLANK"
"DRIVEWAY"
"FIELD"
"FLOWER BED"
"GARAGE"
"GARDEN"
"HOUSE", default
"PARK"
"PROPERTY"
"ROAD"
"SCHOOL"
"SHED"
"WALKWAY"
"YARD"
"STOCKPILE"
"Comment", text, 30, normal, normal
"Building Location", point, "", 1, seconds, 1, Code
"LocationID", text, 30, required, "BD-000001", required, BD-, Label1
"Address", text, 50, required, normal, Label2
"Comments", text, 30, normal, normal
"Water_Sedmnt Sample", point, "", 1, seconds, 1, Code
"LocationID", text, 30, required, required, Label1
"IndexID", text, 30, required, required, Label2
"Matrix_Type", menu, required, required
"Surface"
"Well", default
"Comment", text, 30, normal, normal

"Interest Point", point, "", 1, seconds, 1, Code
"Location", text, 30, required, required, Label1
"Land_Use", text, 30, required, required, Label2
"Comment", text, 30, normal, normal
"Interest Area", area, "", 3, seconds, Code
"Location", text, 30, required, required, Label1
"Land_Use", text, 30, required, required, Label2
"Comment", text, 30, normal, normal
"Sample Area", area, "For odd composites", 3, seconds, Code
"LocationID", text, 30, required, "SP-000001", required
"IndexID", text, 30, required, required, Label1
"Num_of Composites", numeric, 0, 0, 100, 5, required, "Number of Composites", required, Label2
"Upper_Depth", text, 30, required, "Inches", required
"Lower_Depth", text, 30, required, "Inches", required
"Comment", text, 30, normal, normal

Appendix C
Field Sample Data Sheets

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: _____ Page No: _____ Sampling Date: _____

Address: _____ Owner/Tenant: _____

Business Name: _____

Land Use: Residential School Commercial Mining Roadway Other ()

Sampling Team: CDM Other _____ Names: _____

Data Item	Sample 1	Sample 2	Sample 3
Index ID			
Location ID			
Sample Group			
Location Description (circle)	Back yard Front yard Side yard Driveway Other _____	Back yard Front yard Side yard Driveway Other _____	Back yard Front yard Side yard Driveway Other _____
Category (circle)	FS FD of _____ EB LB	FS FD of _____ EB LB	FS FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	Surface Soil Other _____	Surface Soil Other _____	Surface Soil Other _____
Type (circle)	Grab Comp. # subsamples _____	Grab Comp. # subsamples _____	Grab Comp. # subsamples _____
GPS Status (circle)	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: _____ NA	Filename: _____ NA	Filename: _____ NA
Sample Time			
Top Depth (inches below ground surface)			
Bottom Depth (inches below ground surface)			
Field Comments <i>Note if vermiculite is visible in sampled area</i>	BD- _____	BD- _____	BD- _____
Entered (LFO) _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____

For Field Team Completion (Provide Initials)

Completed by:

QC by:

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR PERSONAL AIR

Field Logbook No: _____ Page No: _____ Sampling Date: _____

Address: _____ Owner/Tenant: _____

Business Name: _____

Land Use: Residential School Commercial Mining Roadway Other ()

Sampling Team: CDM Other _____ Names: _____

Person Sampled: _____ SSN: _____ Task: _____

Data Item	Cassette 1	Cassette 2	Cassette 3
Index ID			
Location ID			
Sample Group			
Location Description			
Category (circle)	FS FB-(field blank) LB-(lot blank)	FS FB-(field blank) LB-(lot blank)	FS FB-(field blank) LB-(lot blank)
Matrix Type (circle)	Indoor Outdoor	Indoor Outdoor	Indoor Outdoor
Filter Diameter (circle)	25mm 37mm	25mm 37mm	25mm 37mm
Pore Size (circle)	TEM- .45 PCM- 0.8	TEM- .45 PCM- 0.8	TEM- .45 PCM- 0.8
Flow Meter Type (circle)	Rotometer DryCal NA	Rotometer DryCal NA	Rotometer DryCal NA
Pump ID Number			
Flow Meter ID No.			
Start Date			
Start Time			
Start Flow (L/min)			
Stop Date			
Stop Time			
Stop Flow (L/min)			
Pump fault? (circle)	No Yes NA	No Yes NA	No Yes NA
MET Station onsite?	No Yes NA	No Yes NA	No Yes NA
Sample Type	TWA EXC NA	TWA EXC NA	TWA EXC NA
Field Comments			
Cassette Lot Number: _____			
	Archive Blank (circle): Yes No	Archive Blank (circle): Yes No	Archive Blank (circle): Yes No
Entered (LFO) _____	Volpe: _____ Entered _____ Validated _____	Volpe: _____ Entered _____ Validated _____	Volpe: _____ Entered _____ Validated _____

For Field Team Completion
(Provide Initials)

Completed by

QC by

Appendix D
Libby Asbestos Project Record of Modification
Form



Record of Modification

to the
Libby Sampling and Quality Assurance Project Plan
Field Activities
LFO-0000__

Instructions to Requester: Fax to contacts at bottom of form for review and approval.

File approved copy with Data Manager at the Libby Field Office (LFO).

Data Manager will maintain legible copies in a binder that can be accessed by LFO personnel.

Project QAPP (circle one): Phase I (approved 4/00) Phase II (approved 2/01)
Removal Action (approved 7/00) Contaminant Screening Study (approved 5/02)
Other (Title and approval date): _____

SOP (Number and Revision No.): _____

Other Document (Title, Number/Revision): _____

Requester: _____ Title: _____
Company: _____ Date: _____

Description of Modification (attach additional sheets if necessary; state section and page numbers of SQAPP that are affected by the proposed modification): _____

Field logbook and page number where Modification is documented (or attach associated correspondence): _____

Potential Implications of Modification: _____

Duration of Modification (circle one):

Temporary Date(s): _____
Resident address(es): _____

- If appropriate, attach a list of all applicable Index Identification numbers.

Permanent (Proposed Text Modification Section) Effective Date: _____

Proposed Text Modifications in Associated Guidance Document (attach additional sheets if necessary): _____

Data Quality Indicator (circle one) – Please reference definitions on reverse side for direction on selecting data quality indicators:

Not Applicable	Reject	Low Bias	Estimate	High Bias	No Bias
----------------	--------	----------	----------	-----------	---------

Technical Review and Approval: _____ Date: _____
(Volpe Project Manager or designate)

EPA Review and Approval: _____ Date: _____
(USEPA RPM or designate)

DATA QUALITY INDICATOR DEFINITIONS

Reject - Samples associated with this modification form are not useable. The conditions outlined in the modification form adversely effect the associated sample to such a degree that the data are not reliable.

Low Bias - Samples associated with this modification form are useable, but results are likely to be biased low. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimated low.

Estimate - Samples associated with this modification form are useable, but results should be considered approximations. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimates.

High Bias - Samples associated with this modification form are useable, but results are likely to be biased high. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimated high.

No Bias - Samples associated with this modification form are useable as reported. The conditions outlined in the modification form suggest that associated sample data are reliable as reported.